

In This Issue—Starting a Selling Campaign

JUL 28 1922

MOTOR AGE

Vol. XLII
Number 4

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CHICAGO, JULY 27, 1922

Thirty-five Cents a Copy
Three Dollars a Year

A Correction

Contrary to popular
impression the price
of the Jordan is
not \$3,000 — It's
the record with
owners that makes
people talk that way —

Edward S. Jordan

BLACK & DECKER BENCH DRILL STAND

BENCH DRILL
STAND
WITHOUT DRILL

\$33.00

BLACK & DECKER
SPECIAL
HALF INCH
DRILL

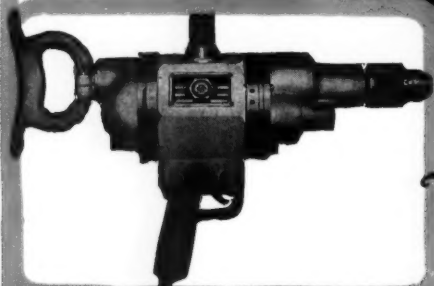
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DRILL STAND
with
BLACK & DECKER
SPECIAL $\frac{1}{2}$ " DRILL

COMPLETE AS
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The bracket supporting the drill may be raised or lowered to suit the height of the work and may be swung entirely around the post, which is a big advantage in locating the hole and for handling large jobs and odd shapes. The bracket is secured in position by means of a hand screw.



YOU can always tell a good mechanic by his tools. He never buys inferior tools because they are cheap, if he can avoid it. But if he is a good business man as well as a good mechanic he guards against unnecessary expenditures.

In most shops a portable electric drill is absolutely indispensable and a drill press often necessary. Good mechanics everywhere are using Black & Decker Portable Electric Drills; and to make it possible for them to have the advantages of a drill press at minimum expense we have produced the Black & Decker Bench Drill Stand.

The Black & Decker Portable Electric Drill can be mounted in this stand in a few seconds and dismantled just as readily. The Stand sells for only a fraction of what it would cost to install a drill press.

The Black & Decker Post Drill Stand is similar in all respects to the Bench Drill Stand except that it has a longer column and is arranged with brackets so that it can be mounted on wall or post and the drilling table is secured on the vertical column with a hand screw so that it can be raised or lowered or swung around.

Be sure to see the Automotive Equipment Association "Shop Profits" Film at your First Opportunity.



Guaranteed by

THE BLACK & DECKER MFG. CO.


Towson Heights, Baltimore, Md., U.S.A.

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This is the new Black & Decker Special Half Inch Drill, which has created such a sensation in the trade by reason of the fact that it combines Black & Decker quality and an exceptionally low price.



Credit

BLACK & DECKER NATIONAL CREDIT SERVICE enables any reliable person in the United States or Canada to purchase BLACK & DECKER equipment on terms that will enable the equipment to pay for itself.

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*"The Well-Equipped Shop
Gets the Business."*

MOTOR AGE

Published Every Thursday by
THE CLASS JOURNAL COMPANY

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59 East Madison Street, CHICAGO

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No. 4

CONTENTS

A Selling Campaign and How to Start It.....	9
<i>By Clyde Jennings</i>	
Difficulties in Selling the Monthly Inspection Plan	17
<i>By Paul Dumas</i>	
Some More Grand Prix Race Car Details.....	19
Wagner Electrical System on 1921 Nash Cars.....	21
<i>By A. H. Packer</i>	
Editorials—	
Why Have Different Wire Sizes?.....	26
A New Form of Fraud.....	26
Speed and the Law.....	27
An Automobile Dealer Lecture Course.....	27
News of the Industry—	
Strikes Begin to Affect Production.....	28
N. A. C. C. Data Show Sales Will Continue Good	28
for Month.....	28
June Production Totaled 288,000.....	29
Durant to Build Flint Car; Takes Locomobile	29
Presidency.....	29
July Dealer Business in Milwaukee Up to Every	30
Forecast.....	30
Buyers Assured of Dealers' Interest After Sale	30
of Car.....	30
Associated Motor Industries Working on Plan	31
of Operation.....	31
Hupp Motor Co. Starts Big Factory Expansion at	31
Detroit.....	31
N. A. D. A. Tells What It Has Accomplished for	33
Receiver Asked for Maryland Motor Co. By	33
Creditors.....	33
Group Photograph of A. E. A. Colorado Springs	34, 35, 36, 37
Meeting.....	34, 35, 36, 37
Concerning Men You Know.....	36
Business Notes.....	37
War Trucks at "Bargain" Prices Hurt the Industry	38
In the Retail Field.....	39
The Readers' Clearing House—	
Collecting Bill by Public Auction.....	40
Installing Ammeter on 1916 Maxwell.....	40
Speed and Weight of Lexington.....	40
Room for Storing Cars in Winter.....	41
Timing and Differential Adjustment on Model	42
37 Allen.....	42
Test Lamp Not Suitable for Locating Armature	43
Shorts.....	43
Double Ignition on Ford.....	43
Adjusting Buick C-37 Axle.....	44
Mystery Tale Solution.....	44
Definition of Candlepower.....	45
Using a 20-Volt Generator for Battery Charging.....	45
The Accessory Show Case.....	46
Service Equipment.....	47
General Motors Corp. Interests Chart.....	48
Coming Motor Events.....	49
Specifications of Current Motor Truck Models.....	50
Specifications of Current Farm Tractor Models.....	52
Specifications of Current Passenger Car Models.....	54

Index to Advertisers Next to Last Page.

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at Chicago, Ill., under Act of March 6, 1879.



Help Your Customers Remove Carbon —and Make Big Profits

A satisfactory customer is where both parties profit by the transaction. When you sell Johnson's Carbon Remover your customer saves \$3.00 to \$5.00 over any other method of removing the troublesome carbon from his motor, without laying up his car. And you make a generous profit from the sale, and gain a friend and satisfied customer.

JOHNSON'S CARBON REMOVER

is a harmless liquid that contains no acid. It has no action on any metal and does not affect lubrication.

The use of Johnson's Carbon Remover every 500 miles keeps motors running quietly and full of "pep." A pint can will clean out a four cylinder motor twice. If necessary, the car owner can apply it himself.

You can make big profits and satisfied customers from a small investment in Johnson's Carbon Remover.

S. C. JOHNSON & SON

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Wisconsin

In Brooklyn—

"We are very optimistic over the outlook for business this year and now that the public trend is growing more and more toward the Oldsmobile, both in the 4 and the 8 cylinder models, we feel that we will steadily forge ahead of our competitors in our respective class. We know we are above competition when it comes to real actual performance and cost of upkeep and we wish to say that we are sure that this will be one of the best years that we have ever had."

OLDSMOBILE COMPANY OF BROOKLYN, Inc.

F. C. STOWERS,
General Manager

Brooklyn, you know, is where a great part of New York City *lives!*

Competition among motor car dealers there is unusually keen.

Here, too—the Brooklyn Oldsmobile dealer reports a decided trend upon the part of New York's *super-critical* motor car buyers toward the Oldsmobile!

Like all Oldsmobile dealers—the Oldsmobile Company of Brooklyn is making money; it is growing; it is thoroughly satisfied with its franchise.

If Oldsmobiles are in big demand in Brooklyn—they will be even more sought in communities where competition is less keen.

Your territory may still be open. Naturally, however, the better territories are rapidly being taken by alert dealers.

The Oldsmobile franchise is eminently worth-while! Prompt action may get it for you. Wire or phone us, or write by special delivery, for an appointment and complete information concerning your territory.

OLDS MOTOR WORKS, LANSING, MICHIGAN
Division of General Motors Corporation



FOURS and
EIGHTS

MOTOR AGE



A SELLING CAMPAIGN and HOW to START IT

*Some Merchandising Ideas from the Experience of Others
That Can Be Used by the Dealer*

By CLYDE JENNINGS

The big selling season of 1922 is here.

The big buying season of 1922 has just closed.

The buying season of 1922 was the biggest ever.

Now is the time to get busy and make the 1922 selling season the greatest ever.

Two such successes in the same year would make 1922 automotive year the most notable of all merchandising events.

If we all get busy, this will be an easy accomplishment.

The specifications of the merchandising vehicle on which this can be accomplished are so simple that they appear to be almost ridiculous.

The buying season came of its own accord and it kept everybody in the selling business so busy that they have not had much opportunity to think about selling. Now we will probably have a bit of leisure and merchandise will come through in such quantities that selling campaigns can be entered into with the confidence of not disappointing customers. Here are the specifica-



tions for the campaign that should carry on high daily receptive figures:

Let all of the people of your neighborhood know that you have something to sell.

Ask all of the people of your neighborhood to buy what you have to sell

Study your merchandise until you are convinced that you have a good article.

Make all of the people of your neighborhood believe that what you have to sell is good merchandise.

If you are the right kind of merchant the people you know will believe what you say. If they do not, prove that you are right.

Arrange your merchandise so that you can sell quickly.

Simple enough, isn't it? Not much high-brow stuff or science about it. Just the plain old doctrine that has proven its worth to so many merchants. Just the principles that have made so many men rich.

They are the same principles that have endured for years. Just the points that have wrecked so many men who have ignored them. Now let's take them up one at a time and see what we can make of them.

Let all of the people of your neighborhood know that you have something to sell.

That appears to be a perfectly obvious thing to do, but many merchants ignore it. Recently in a distributors' meeting 45 per cent of the automobile dealers admitted that they did not have the name of the car that they wanted to sell on the outside of their establishments. Some of them had sold their sidewalls to other advertisers. Indeed some of them had permitted sign painters employed by a rival car merchandising department to paint signs for other cars on their walls.

As a matter of fact, it appeared that 45 per cent of the dealers for this particular car in this district were taking pains to keep the fact that they had signed a contract to sell this car a secret.

The same is true with accessories and other automotive equipment. Only a few of the small town dealers show accessories and such things as they have for sale in their show windows. Very few dealers in the smaller towns advertise that

they have bumpers, spot lights and such things for sale. Chicago department stores thrive on customers who come from outlying neighborhoods and distant towns and who pick up automotive articles from the counters and buy them without a semblance of service because they think these articles are "big town stuff." As a matter of fact probably half a dozen merchants in their home towns sell the very same article at a lower price.

But the people do not know it. They cannot be expected to know the family secrets of every one, even in a small town.

Another way to let people know that you have something for sale, and what that something is, is to wash your windows, paint your store front and otherwise make people take notice that you are on earth. Put one of the cars you have for sale in your front windows and place lights so they will show this car at night.

A down state dealer recently came near losing his dealer franchise because the distributor came to the town and found that the dealer was using part of his salesroom space for his storage garage business. And to make it worse, the cars in sight from the street were not the cars he had for sale, but two rival cars. There were plenty of the cars this man sold in the storage part of the garage, but it had not occurred to him that he should always exhibit in places of interest the cars that he had for sale. The fact that other cars were standing at his front windows, did not seem to mean anything to him.

After the establishment has been well cleaned up, signs painted on the building and windows and other such steps taken, a sign projecting across the sidewalk should be erected. The reason is that frequently the motorist does not see the flat signs, but if there is a projecting sign, he will be quite certain to see it. Especially does the projecting sign attract the motorist who stops at the nearest intersection and looks down the street. This sign should be brief and to the point. Something like this:

Runwell Cars and Trucks
Sales and Service
Storage by Day or Month

That will be quite sufficient. The motorist today expects the man who sells his kind of a car to sell the things that go with it. He will come and inquire.

There are other ways of reaching the people of your community by advertising that is not of sufficient cost to bother the factory about. If you do not advertise extensively, at least keep your name in the local paper in a card carrying the name of the car you sell and other permanent facts about your business.

Program advertising and such features are not highly regarded by big advertisers as being the proper sort of publicity.

But an automotive dealer cannot afford to be without representation in civic movements, even if he must pay all of the cost out of his own pocket. Indeed, it is quite proper that he should, as this is his own advertising rather than advertising for his car. But programs of affairs that are not entirely representative become quite another thing. Each incident of this kind is a single incident and should be decided on its merits.

The main thing is to keep yourself and the merchandise you sell before the respectable people of your community. Advertising the vehicle, is something apart from what is being written about here. The factory can help you with that. But why expect the factory to do the whole thing?

Ask all of the people of your neighborhood to buy what you have to sell.

This is very closely related to much that was said under the previous subhead, but the subject is by no means exhausted.

You all are doubtless familiar with the "Ask 'Em to Buy" film story, in which is pictured the man who stands at the gas pump and asks each customer for gas to buy something that he obviously needs. Tires, bumpers, tire testers, spark



plugs, luggage carriers and spot lights are obvious things of this sort.

The application of this idea can and should be much wider than this. In Houston, Tex., an accessory dealer trained 20 college boys and started them out to sell accessories by calling on car owners. He gives to these young men all of the profits on their sales. His idea is that these young men will create a great many new customers and that the company will profit by this work after the boys have gone back to school. This is looking ahead and is rather a daring project.

Suppose you are selling Runwell cars and trucks in an average small city and that you figure that you cannot afford to pay a salesman. You have one or two models of the Runwell on display. Perhaps you have taken our advice, cleaned up the salesroom, painted a sign on your windows and otherwise are ready to receive callers, but none come. You are too busy in the shop to get out yourself.

Why not engage a young man in the community who is undecided as to his future and talk to him several evenings about the Runwell car. Get him enthusiastic about it. Let him drive your personal car, for of course you have one of the make that you sell. Then start him out calling on everybody in town, telling them that you sell Runwell cars and asking each one if they will not come around and look at the new coupe.

Tell this lad that for each purchaser that he brings in you will pay him \$50 or whatever price you see fit. There are a lot of fine youths around the smaller cities that are waiting for a push to enter business. One of them can hardly help bringing in a customer or two, perhaps enough customers to make him believe that he is a salesman and he will get interested and put the job over for you. At least, if you start the lad right, you will get one enthusiastic booster in your neighborhood. Let him have a commission on all other merchandise he can sell.

All of this, of course, applies to trucks, tractors or whatever else that you may have to sell. Tell the young man to make a list of all of the cars in town without bumpers and then help him a bit to sell bumpers to these persons. Bumpers should be easy to sell. Millions of them have been sold because they add to the appearance of the car. Millions more should be sold because they are good protection.

Then repeat this list for all of the necessary accessories that you carry or want to carry and prepare special advertising for each of these lists, telling the car owner that you have the bumper, or other accessory, that is best adapted to his car.

Then too, talk much about spares. Spare tires, spare spark plugs and spare everything else that comes in that class.

There is a shoe shining establishment in Chicago that has this sign where every person who occupies the chairs must see it:

"You have extra collars and hose, why not extra shoe laces?"

The young man who runs the place says that this sign brings up visions of trouble with broken laces in the morning and at other embarrassing times and that it sells a good many laces for his establishment.

Perhaps you object to copying a merchandising effort from a shoe shine parlor, but if the other man thought of it first,

why object to making some of the money for yourself? If you had been first, the shoe shine man would have applied your plan to his business.



There are, of course, thousands of ways of asking people to buy. Word of mouth is the most effective. Advertising letters and circulars must be considered. Advertising in recognized publications, if the publication goes to the people you want to reach, is the most approved and most general method.

Some way there appears to be a good deal of mystery about advertising when there should not be. Any man who has merchandise, knows why he bought it and why he expects to sell it. If he will put his reason into words, just plain conversational words, it ought to be good advertising. The trouble with most advertising is that the writer of it tries to put in extra flourishes. Advertising to be effective should be mostly just plain, every-day reasons why this merchandise is desirable.

Study your merchandise until you are convinced that you have a good article.

It does not make any difference what you are selling, the best of success will come only to those who believe in the merchandise.

If it is a car, study that car until you learn its points of superiority. If you cannot find any such points in the car you sell, it is time that you looked about for another car. It is a curious fact that some men are entirely unable to get a very firm belief in one car, while other men equally honest and intelligent will believe firmly in this particular car. A dealer should certainly believe in the car that he sells, if he expects to make a success of it.

The same is true of everything that he sets out to sell. This opinion does not reflect as to everything that the dealer puts into stock. Many accessories must be stocked because the people want them. They may not be the very best, and the dealer may know it, but he is in the business to make money and to supply the merchandise that is in demand. As long as that merchandise is not dishonest, there is no reason why the dealer should not sell it, but he should be truthful when he sells it. No other method can succeed.

The principal of merchandising today is to sell a few things and to keep the others in stock for buyers. An accessory dealer, with an extensive stock, could not possibly give full energy and attention to the selling of his entire line. There are too many items. His best success should come from specializing. Change specialties as frequently as necessary for good results but always push articles that you have faith in.



You owe it to yourself and your business future that you should believe in your merchandise and your employees.

Make all of the people of your neighborhood believe in what you have to sell is good merchandise. If you are the right kind of merchant, the people will believe what you say. If they do not, prove that you are right.

All of these topics are so closely interwoven, as the fabric of merchandising must be, that it is difficult to touch on one thread, without finding it intertwined with another. Much of what is to be said under this topic has been said, with this exception:

Reputation is one of the very best assets of a merchant. The people remember the man longer than they remember the merchandise that he sold. The reputation for reliability is your strength in your community.

In the automotive business, this feature is beginning to assert itself very strongly. Manufacturers are looking into the history of the men they pick as dealers. They are shy of the man who has sold cars but has not taken care of his customers, as they believe that this man's reputation for neglect in his neighborhood will overcome the good reputation they may be able to establish for their car by advertising or other means.

The Car and the Dealer

It happens in many neighborhoods that a certain make car has a bad reputation and in the adjoining neighborhood it is quite well thought of. Usually you will find the solution of this contradiction in the reputation of the dealer.

A man who expects to make his living by selling merchandise to the people should be exceedingly careful of his personal reputation. Every merchant will make mistakes occasionally in the selection of merchandise. When he does, he should be honest with his customers and go as far as possible in the correction of this mistake.

Arrange your merchandise so that you can sell quickly.

On a rainy day every man and woman who does not have an umbrella is regarded as a possible customer for one by the umbrella merchants. First thing in the morning the merchants hang out his red, white and blue umbrella, puts his signs on the show windows and pulls his crate of umbrellas up by the door so that he can sell his stock with dispatch and neatness. He does not keep his customer waiting at all. A clerk is right there to hand out the much needed article.

On a rainy day every motorist who has no chains on his

car is a prospect for a sale of chains. Now let us ask a few questions:

How many merchants who carry automobile chains in stock regard the rain as a notice to put up chain signs?

How many sort out their stock and bring it near to the door?

How many assign a special clerk who knows chains to wait on the trade?

How many capitalize the rain or sleet at all by a merchandising effort?

The umbrella men have learned by long experience that their method is profitable. The public expects just such treatment and responds. It is sort of a habit.

Recently a severe rain caught a motorist out with his car and his first thought was chains, as he had a long drive on smooth pavements ahead of him. He wanted 32 x 4 chains, certainly an ordinary size. He drove up to a store. Of course they had them, but where were they? Everybody in the store took a look here and there. There was a wild scramble. Just as the customer was starting to drive away, the partner who devoted his attention to the shop came out with the chains. He had found them under the salesroom desk!

Probably you cannot keep all sizes of everything right on the display counter or the nearest shelf, but there is no reason on earth why you should not keep your stock so that you can step into the stock room and get it when it is called for. Few automotive accessory stocks are so large that a fairly competent clerk cannot know what is at hand, without asking the customer to wait until he looks through a lot of dark corners and out of the way places to find out.

Every accessory merchant should have a stock sheet that shows what articles he plans to carry in stock. This sheet should be referred to frequently and checked against the stock.

There is no reason for carrying a heavy stock of most items. This country is well covered with jobbing establishments. These jobbers break cases and will sell the dealer what he wants in the way of quantity. It is best to carry a larger stock in variety than to tie up the same money in a quantity stock of a few articles and sizes.

Remember that you must sell two-thirds of the stock that you ordered before you really get any profit out of what you bought. Attention to stock keeping will avoid your being out of any article when the customer calls for it.

The spark plug manufacturers have set a very fine example of stock keeping. They supply specially made cases so that the plugs for the various cars are kept in separate compartments and you can tell at a glance, just what you are short on. Apply this principal to other merchandise.

Weekly Tours Introduce Overlands to State Dealers

1000-Mile Circuits From Indianapolis, with Demonstrations at All Towns Visited

INDIANAPOLIS, July 22.—The Indianapolis branch of Willys-Overland is conducting an eight-car motor caravan educational tour throughout Indiana, showing all models of Overland and Willys cars, and introducing the new line of commercial Overlands with Martin-Parry bodies. The caravan, which will operate for several weeks, leaves this city every Tuesday and makes a circuit of Indiana territory. The first tour last week went through northern Indiana, in a 1,000-mile circle with detours and extra trips off the main route, and visited 22 cities where there are Overland dealers. It is said that every dealer visited bought at least one of the new commercial types.

Phaetons and sedans of Overland and Willys-Knight head the processions.

These are followed by a panel delivery type Overland, an open commercial body and an Overland open delivery type with express and an enclosed cab.

At the night stops and the principal day stops regular exhibitions are given. A car with musical bells being sent throughout the town to attract attention and to advertise the show by the signs carried on the car. At the exhibit space, sometimes the public square or a park, or some open space in the heart of the town, a regular show is put on with talks about the cars, the new commercial types, the parts and all the features that make for popularity of these vehicles and types. Even the service man is called on to talk to the people and to tell them of the parts, and how they compare with the parts of cars in the same general class.

The dealers already visited are said to be very enthusiastic about the caravan educational tour. Many of them who were pessimistic of the possibili-

ties of commercial vehicle sales in their towns have bought as a result and show that they really believe in their praise. Aside from introduction of the commercial type, the complete line of cars in the caravan makes a fine impression on the people who see the parade. Each car is lettered with slogans and signs which, in the case of the sedans, are lettered on the glass of the windows. Two of the commercial cars carry large signs, while a third delivery car has a well-displayed parts exhibit mounted on boards.

GARAGE PROPRIETORS WARNED

CHICAGO, July 22.—A warning to garage owners to comply with the Illinois state law requiring registration of serial and license numbers of all automobiles left in their charge was issued by Judge Prindiville who assessed a fine of \$100 and costs against a Chicago garage proprietor who had neglected to comply with the regulation.

Buick Adds Touring Sedans, Making New Line 14 Body Models

Body, Engine and Chassis Changes Numerous — Larger Crankshaft and Better Oiling System. Spring Suspension Changed by Kickup in Frame Over Axle

FOR 1923, the Buick line will consist of fourteen passenger car models on the six and four cylinder chassis and the four-cylinder special delivery truck. Two of the passenger car bodies are new. These are touring-sedans, one being mounted on the six-cylinder chassis and the other on the four.

While fundamentally this is the same line as was on the market in 1922, there are a great many changes of both major and minor importance in the chassis and bodies. Material changes have been made throughout the entire line from an appearance standpoint. Mechanically, although there have been no radical changes, there has been a remarkable number of detail refinements to promote durability, silence and absence of minor mechanical difficulties. With the sport and touring-sedan bodies, which have been added recently, the Buick line now offers a choice of nine bodies on the six-cylinder chassis, which is made in two wheelbases to accommodate the different body styles, five bodies on the standard four-cylinder chassis, which is made in one wheelbase, and six body choices on the special delivery truck models mounted on the four-cylinder chassis.

Six-Cylinder Improvements

The Buick six-cylinder models have been greatly improved from the standpoint of appearance, riding qualities and durability. All of the models on this chassis have been lowered approximately 3 in. The lowering has been accomplished by a modification of the spring suspension by which the offset of the cantilever spring has been increased 4 in., making the forward end of the spring 14 in. longer than the rear. This has resulted in lowering the car, reducing rebound and eliminating side sway. An important series of changes which has resulted in the Underwriters' insurance rating of Class A has been obtained by fitting a transmission lock, drip bowl under carburetor, extra clips on the gasoline feed line and tail lamp wires and flexible steel covers on all three wires leading from the generator to the switch and rounding of corners on all covers for wires.

Engine Changes

Improvements have been made in the engine by lengthening the pistons $\frac{1}{2}$ in. above the wrist pin, lengthening the connecting rod $1 \frac{3}{16}$ in. and raising the

block $1 \frac{11}{16}$ in., so that the compression remains the same with the longer piston and connecting rod. This has been done to eliminate piston slap and wearing piston walls. To further increase the life of the cylinder bore, the new pistons are machined with a tapered relief. There is no longer a guide ring at the bottom of the piston, the skirt being plain at this point. The pistons no longer overrun the bottom of the cylinder bore.

New Casting Process

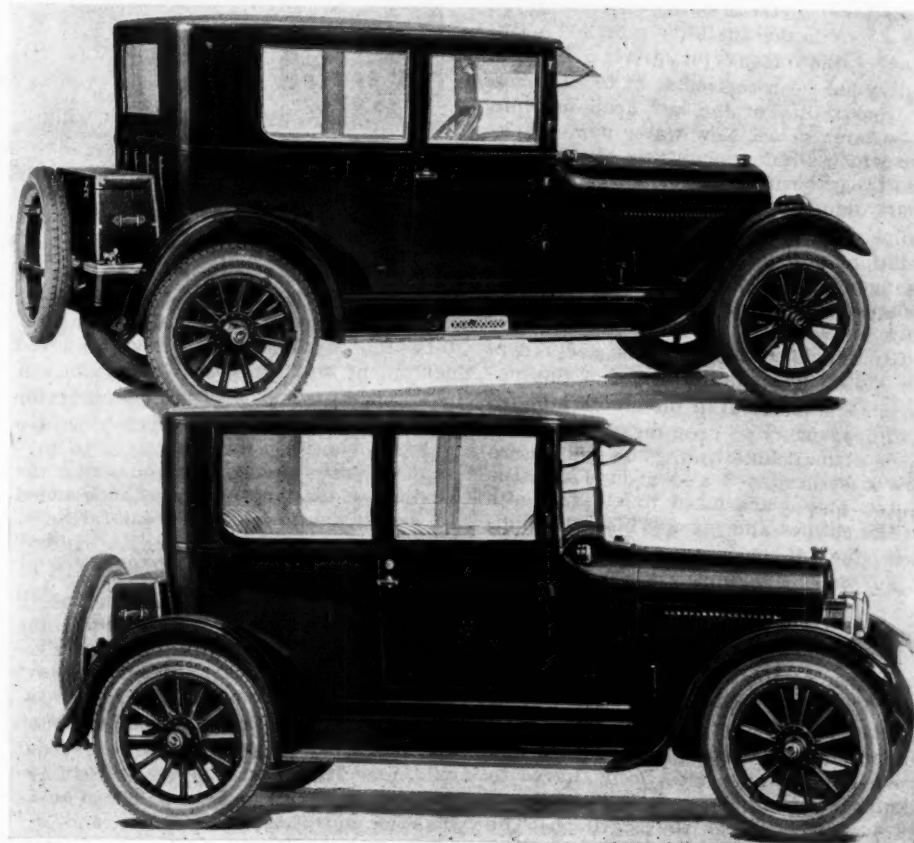
The chilling of the cylinder bores is something new in foundry practice for cylinders. It is done to overcome the natural annealing process which takes place in the part of the casting surrounded by water jackets. Naturally, at this part of the cylinder, cooling is much slower, with the result that the castings are generally softer at the portion of the bore surrounded by the water jackets. As this is the point subjected to the greatest wear by the pistons, it is an ob-

jectionable feature. By the chilling process, this part of the casting is cooled off just as quickly as the remainder, resulting in a harder casting, although one which is just as readily machined since the hard spots are not localized. The bores are finally finished by honing. The honing tool is similar to a reamer, except that it has honing stones in place of the reaming cutters.

The crankshaft is now $2\frac{1}{4}$ in. in diameter and harder babbitt is used in both the connecting rods and main bearings. Individual pressure feeds are brought from the oiling system to the center main bearing and the main bearing caps are drop forged with the babbitt tinned directly to the caps. To make the oiling of the piston more positive at high speeds, the oil troughs are flanged to insure a supply of lubricant.

Extensive Bearings Improvements

Other bearings throughout the power-plant have also been given attention to



Two recently added sporting models of the Buick line, the upper view showing the six and the lower the four-cylinder. All of the six-cylinder models have been lowered approximately 3 in.

give longer life. The fan bracket bearing has been increased in length and diameter. The hole in the gearcase cover for the fan bracket now has a bronze bushing and holes have been placed in the rocker arm covers so that the rocker arms can be oiled without moving the large cover. These holes are provided with a sliding cover to close them against dust.

A careful study of the valve system has been made with the idea of making this more quiet. In order to eliminate the varying clearance, due to expansion, a combination push rod of aluminum and steel is now being used, so that the valve will have about the same clearance from zero to boiling point. The lower portion of the push rod is aluminum and the upper portion steel. The aluminum, on account of its greater coefficient of expansion, is employed to give a more rapid expansion to the push rods, so that the expansion of the parts of the engine which tend to lift the valve action away from the push rod and to increase the clearance will be equalized by the expansion in the push rod itself. This permits the tappets to be adjusted several thousandths closer, eliminating push rod noises. Felt has been placed around the valve stems inside the valve springs to carry oil for the valve stems and guides. This provides enough lubrication to prevent sticking and squeaky valve stems. More positive lubrication is also assured for the front camshaft bearing by providing an oil well at this point.

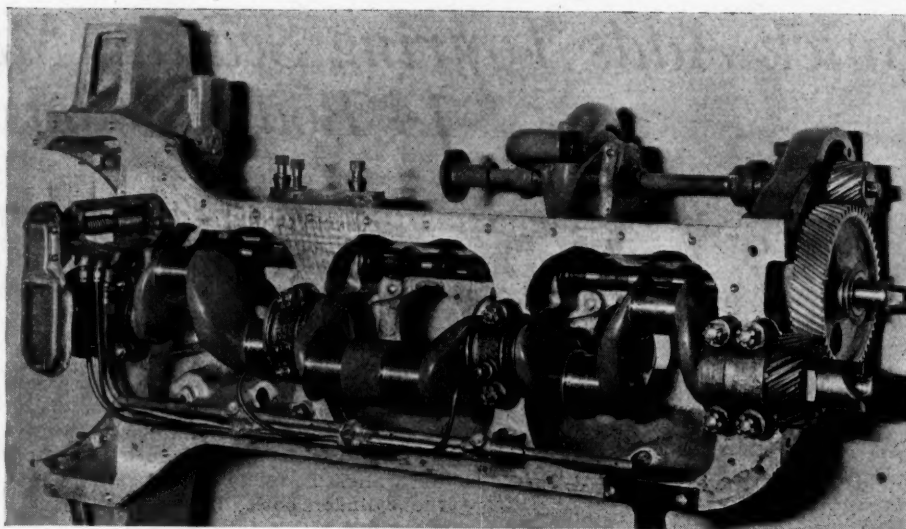
Auxiliary Units Modified

Better construction is also employed for some of the auxiliary units. For instance, the means for driving the fan pulley has been revised so as to eliminate the possibility of the key dropping into the timing gears. New water pump packing which eliminates cutting of the pump shaft has been employed and the pump shaft diameter is now stepped to insure proper assembly of the propeller. The location of the taper pin has also been changed to prevent damage to the water pump body in case the taper pin should back out.

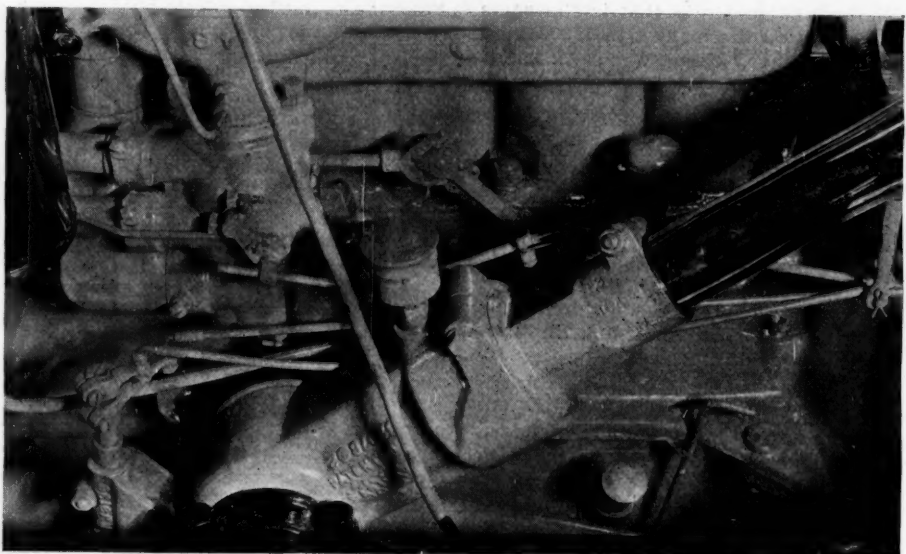
Greater durability has been secured in the clutch by changing some of the material. The material in the clutch hub, for instance, is now drop-forged steel in place of malleable iron. The splines are now case-hardened and ground and the clutch plates are fitted to closer limits on the splines and pins. This will eliminate much of the wear and take out rattles.

Electrical Equipment Revised

The electrical equipment has been gone over completely. The motor generator has been redesigned in regard to its electrical characteristics to give it a higher charging rate. The brushes and brush holders have also been altered to eliminate squeak and more accessible oilers are provided for the bearings. The brush holder is now a die casting with a bronze spring member which has sufficient give to eliminate the chatter which was found to be the foundation for



Instead of being oil splash lubricated, the crankshaft is now provided with pressure leads to the center main bearing



The new steering gear housing which has been inverted with the slot at the top to better retain the grease

squeaking. This new brush holder was worked out at the General Motors laboratory in Dayton and is now standard equipment on this type of generator. A new type of silent overrunning generator clutch is employed and spiral teeth are now used on the starting gears to prevent excessive noise when chanking the engine. A tension spring has been added to the starter pedal to prevent rattle.

Rear Axle Features

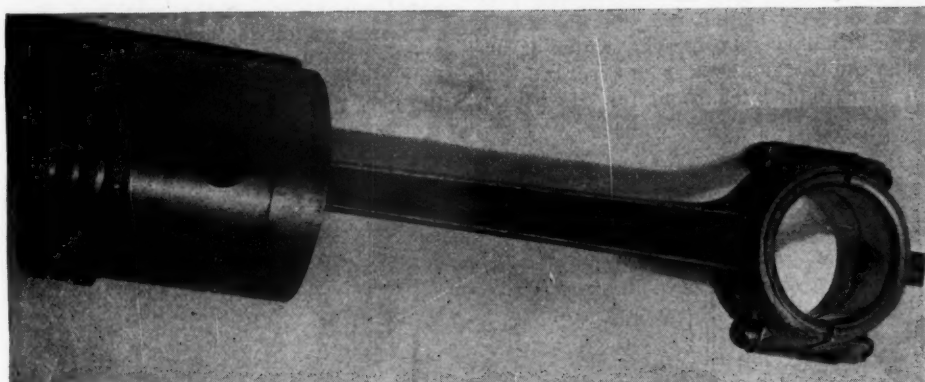
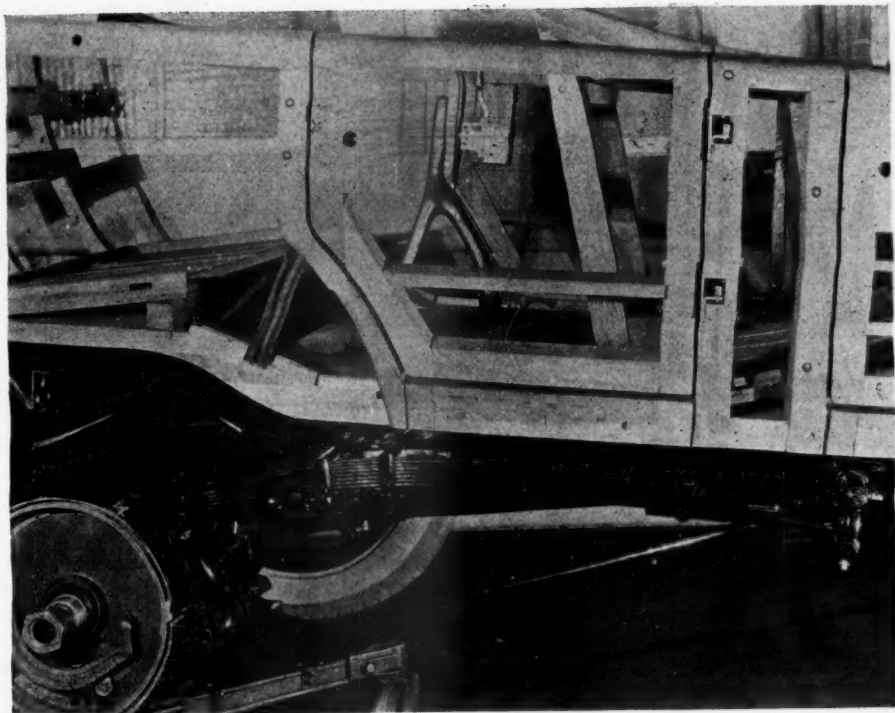
The rear axles have been modified in some respects. On models 44 and 45, the three-passenger roadster and the five-passenger touring car, the brakes have been increased from 12 in. to 14 in., which now gives the same size brakes on all six-cylinder models. On the front axle, new style bushings are used in the steering knuckles and arms. These bushings are hard-burnished bronze and, according to the Buick engineering department, will give three times the life of the present bushing.

New Departure ball bearings are now

used on the differential in place of the roller type formerly employed. The rear axle gear ratios are now 4.4 to 1 on all of the open cars and on the five-passenger sedan and 4.7 to 1 on the remaining models on the six-cylinder chassis. This is in combination with 32x4 cord tires on the three passenger roadster and five-passenger touring car, 33 by 4½ cords on the five-passenger sedan, the four-passenger coupe, seven-passenger touring car and seven-passenger sedan. The tire size on the sport model is 32 by 4½. The strut rods on model 45 have been increased from ¾ in. to 11/16 in. in diameter and the truss rods on the model 45 increased from ½ to 9/16 in. in diameter. These are now of better steel and heat treated. The frame has been stiffened considerably by increasing the thickness of the stock in the side members from 5/32 of an inch to 3/16 in.

Spring Suspension

The spring suspension has been altered, as mentioned, and in addition to



Buick 1923 spring suspension showing new location of hanger which is much closer to rear end to prevent side sway. Lower, new piston and connecting rod assembly. The rod is longer and the piston is entirely new, with the bottom ring eliminated and a tapered clearance obtained at the ends of the piston pin boss. The piston is also much longer above the wrist pin than formerly

the change in location of the spring hanger, the main plate and all the front springs of the six-cylinder model have been changed from carbon steel to vanadium steel. The steering gear housing has been changed to bring the clamp boss on top, which also brings the slots on top and prevents leakage of grease. The oil can bracket has been moved from the left to the right hand side, where it is more accessible.

Changes in 4-Cylinder Models

The radiator shell has been reinforced on the inside and a bracket has been placed on the outside to eliminate the opening in the shell and eliminate breakage at that point. The radiator core support angles have been increased in thickness and the bolts for fastening the core to the shell have been increased in size.

The changes in the four-cylinder chassis parallel almost exactly the changes in the six. In general, the appearance of the entire four-cylinder line has been im-

proved by redesigning the bodies and tops. The radiator has been raised $1\frac{1}{4}$ in., the cowl lengthened 3 in. and the hood line from the radiator to the windshield has been straightened. The top has been lowered $2\frac{1}{2}$ in. and a kick-up has been placed in the frame over the rear axle, which permits the rear end of the car to be lowered. The model 35 car, which is the standard touring design, is 5 in. lower than its predecessors and the complete line of cars is lowered in proportion.

The changes made to secure the Class A Underwriters' rating have been also made in the four, and the mechanical changes for quieting the motor and securing greater life throughout the chassis, which have been described for the six, have also been made in the four-cylinder engine and chassis units.

Body Refinements

Throughout the Buick body lines there are certain changes which are common

to all bodies, and a few detail changes on each particular body model which apply to that body alone. On all of the six-cylinder models, nickel beading has been put on the cowl at the rear end of the hood not only for the sake of appearance, but also to prevent wear on the cowl. Nickel beading is also used around the radiator cores on all models except the sport. The sunshade design has been revised to give better appearance. It is of solid sheet metal panel, covered with imitation leather with die-cast ends. The back lights in the bodies have been reduced in size and the rear quarter light frames have rounded corners. All of the molding is oval instead of sharp corners. Similar to the open bodies, the cushions have been lowered and the seats rearranged to increase the comfort for the passengers.

In the four-cylinder line, the body changes follow the changes in the six-cylinder line very closely. An interesting series of improvements amounting to really an entirely redesigned job have been made in the four-cylinder touring car. Besides lowering the seats and rearranging the steering gear and control levers as in the six-cylinder model, the body is much more rigid in construction. The front pillar brace irons are heavier, as are also the rear tonneau brace irons. The windshield bracket and top seat rail have also been made heavier. The door locks are stronger and the entire body is tied to the chassis better by using ten body bolts instead of eight. All of the closed bodies have been entirely redesigned for greater rigidity and have been brought thoroughly up-to-date in appearance and trim. The general features outlined for the other models have been incorporated in them.

Tops Redesigned

Probably the most impressive thing about the Buick body line is the great attention which has been given to detail and the number of small refinements which have been made in each of the bodies for appearance and comfort. The painting on the three-passenger roadster is now blue with gold stripes. A flush rear deck door with an improved lock is fitted; a tire carrier is used tilted toward the deck. The trimming at the sides of the seat is now piped instead of plain. The sides of the body under the cowl are trimmed. The rear curtain light glass is now 6 by 24 in. in a nicked frame. The passengers sit lower in the car, and although the top has been lowered and redesigned, more head room is provided.

On the six-cylinder, five-passenger touring car deep black with gold stripe painting has been adopted. The tops have been redesigned and lowered, seats lowered and steering gear location changed to provide greater ease in driving. The trimming of the back of the front seat has been changed and a roll added around the top to improve appearance. There is now a large compartment for curtains in the back of the front seat.

On the six-cylinder, seven-passenger car a rear-vision mirror, sun shade on the windshield and gasoline gage on the

instrument board are included as standard equipment. More room has been given the body by widening the rear seat 1 in. The back of the front seat has been entirely redesigned and a roll added around the top for appearance. The trimming of the auxiliary seats has also been improved and the front seat frame is now trimmed.

New Touring-Sedans

The model 41 touring-sedan, which has been put on the six-cylinder chassis, is an entirely new body. It is a five-passenger car with special touring equipment, including a trunk rack in the rear. The lower part of the body is maroon with a black top, and the wheels are also maroon, but several shades lighter than the body. Nickered guard rails are placed on the rear of the body. As a touring convenience on this model, the gasoline tank is increased to 22 gal. Extra wide doors are provided and ventilating windows are placed in the doors and side windows. The car has a heater as standard equipment. The trunk is also provided as standard.

On the 118 in. wheelbase are the five-passenger touring-sedan, three-passenger roadster, five-passenger touring car and five-passenger sedan. On the 124 in. wheelbase are the four-passenger coupe, seven-passenger touring and seven-passenger sedan, and also the sport roadster and touring car.

Kansas City Speedway to Open on Saturday, Sept. 16

\$500,000 Race Track to Be Dedicated to Kansas and Missouri A. L.

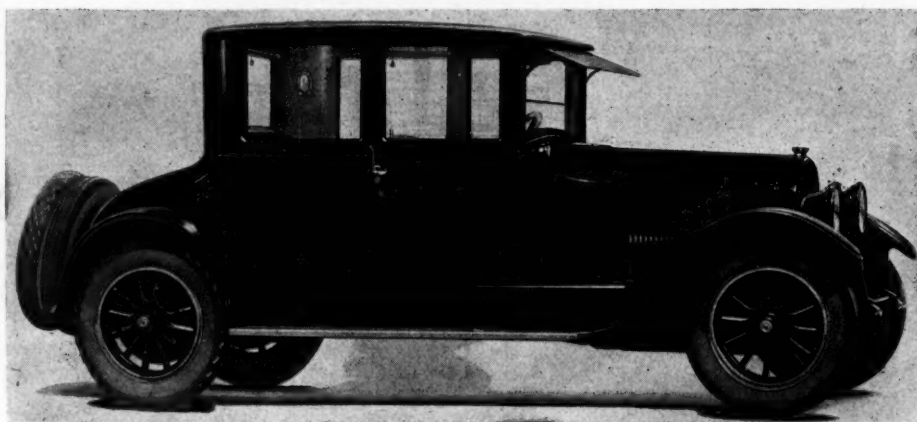
KANSAS CITY, July 24—According to officials of the Kansas City Speedway Assn., the date set for the opening of the new speedway, under construction at Ninety-first and Holmes streets, is Saturday, Sept. 16. The speedway, which is reported to be costing \$500,000, will be dedicated by the American Legions of Missouri and Kansas.

The legions will put on a program which will last for an hour or more. This program will feature stunts, a flag raising, band concerts and a parade. Then will follow the automobile race.

"While it appears that the task of completing the track in sixty days seems to be hopeless," says E. E. Peake, secretary and manager of the Speedway Association, "we will be ready on the date set."

Racers have not been booked thus far, but it is a known fact that many of the leading racers of the country will be here to participate in the 300-mile race. Many of the racers were seen at Indianapolis and they expressed their desires to enter the race here in September.

At last fifteen or twenty entries will be made for the race. The first purse will be made up of \$30,000.



Cadillac Offers a Victoria Type of Body

A NEW Victoria type of body is now being put out by the Cadillac Motor Car Co., on its type 61 chassis. The new model, four-passenger Victoria, has been altered in dimensions to give the effect of greater length and less height. The interior has been considerably enlarged to provide more room for the occupants. The seats are longer and the driver's seat is now placed in such a way that it is directly behind the steering wheel. The auxiliary folding seat, which is beside the driver's seat, is so arranged that it gives added leg room for the person

occupying it. The rear seat has also been lengthened and widened.

The interior appointments have been refined by the use of new types of pull-to handles on the doors and other fittings. The features in the former Victoria model have been continued. These include rear corner lamps, parcel compartment directly behind the driver's seat, foot rest, cigar lighter, leather panel sun visor and the rear deck compartment which is large enough to accommodate a small trunk, several bags, golf clubs or fishing kit. The price on the new Victoria is \$3,875 f. o. b. Detroit.



New Winton Six Roadster

Winton has introduced a new roadster to its line, the chief features of which are reduction in weight and a resultant more economical operation; greater gasoline mileage obtained by better manifolding and carburetion and the general simplification of the chassis. The body

is a well designed job and luggage can be stored in the rear compartment, entry to which is afforded by large doors on the side. The springs are 40 and 61 in. front and rear, respectively. The price is \$3,400.

NEW NASH PLANT STARTED

MILWAUKEE, Wis., July 24.—Work on additions estimated to cost more than \$350,000 to the Nash Motor Co.'s four-cylinder car division in Milwaukee was started late last week by the contractors. The plans for this extension as originally projected a short time ago show a material enlargement in the specifications in the contract. This is due to larger pro-

duction needs which have definitely developed in the last month or two, it is said. The main addition will measure 200x950 ft., of brick and steel, and another building to be erected is an administration building, 50x200 ft. The new facilities will be ready about Nov. 1, when the capacity of the Milwaukee Nash plant will increase from 60 cars a day to 100 or better. B. W. Twyman is general manager at Milwaukee.

DIFFICULTIES in SELLING the MONTHLY INSPECTION PLAN

The Car Owner Has Many Firmly Implanted But Erroneous Ideas That Must Be Routed Out Before the Proper Picture of His Car Can Be Drawn

By PAUL DUMAS

THERE is a vast deal of difference between the theory and practice of automotive maintenance today. A dealer may be absolutely sure that he has the right idea on maintenance, but if he does not take into consideration the attitude of the car owner, and convert the owner to his theories, this dealer will not get very far in maintaining cars by his theories.

Much educational work with the car owner is necessary. The theory of monthly inspection, for instance, is ideal, but the car owning public is a long distance from accepting this ideal. Many owners believe, for instance, that the monthly inspection suggestion is merely another way of taking money from them. You constantly hear practical men point out a railway engine as the ideal for the motor vehicle as to dependable runs. Yet if you call attention to the fact that the steam locomotive has constant care, inspection and lubrication, they are likely to shrug their shoulders and smile at you with tolerance.

Cost of Ultimate Overhaul

So the dealer who believes in the monthly inspection system must expect to meet considerable opposition for some time to come.

There are some owners who are firm believers in the doctrine that a motor vehicle runs farthest and with least expense when left strictly alone. Some car owners register pride in themselves and their car when they speak of the 20,000 miles of operation of the car without ever touching or examining any part of the mechanism. It is true that many cars have done considerable mileage without any attention whatsoever, but rarely does the car buying public hear of the expenditure of money that was necessary to recondition that same car.

Whenever a man boasts of the service he has received from his car just through neglecting it, he tells only half the story. The last chapter he has omitted, and in that last chapter is wound up the story of that car's life.

The owner who boasts of the service and mileage he has secured through the artistic practice of neglect never does boost the car or dealer when he thinks of the price he paid to have the car completely overhauled.

He will, however, most probably condemn one and all maintenance institutions as being highway bandits of the first water, having forgotten the ancient proverb concerning stitches in time, which is applicable to cars as well as to clothing.

A Question of Trade-in Value

Then there is the owner who, after having removed the youth from the car through neglect, wants to trade it in on a later model. The attitude of dealers regarding trade-ins shows a wide variance of opinion and, due to the different views of the various dealers, owners in general have formed the opinion that a large trade-in value is always available, regardless of the condition of the car at the time.

The unwise appraisal of used cars has had the effect of instilling in the owner a dislike for the maintenance depart-

ment which is only natural, because as long as a poorly kept car has practically the same resale value as the car that has received reasonable attention, there will be no desire on the part of the car owner to ever visit the maintenance station.

At first thought it would seem that anything that would tend to prolong the life of the individual car would defeat the purpose of the dealer, which is to sell cars. This involves some points in salesmanship which concern the saturation point of the market, which at present seems about as imminent as the enactment of a prohibition law in France.

Long Car Life and Repeat Sales

Getting down to first principles, it sounds reasonable that the more thoroughly the doctrines of car preservation, which means systematic inspection, are drilled into the car owner the more prosperous, eventually, will be the car dealer. Better maintenance methods mean longer individual car life and lowered selling costs, with the result that the future of the institution can be gaged with some certainty. The high grade of advertising which is obtained from being the agent of a car that is noted for its reliability and freedom from the noises that bespeak old age, will be of greater value in future sales efforts than having been the agent of a car that initially sold in great quantities but which two years later was seen in great quantities in the automobile junk shop.

Uninterrupted service from any mechanism can be secured only through maintaining the mechanism at somewhat near its original condition. Acknowledging that the automobile is a form of transportation, fundamentally, it is logical to believe that as such the individual unit of this form of transportation should receive at least as good care as the unit in the railroad method of transportation. The entire success of railroad rolling stock maintenance depends on and is due to the systematic and thorough method of inspection. Generally speaking, automobile maintenance as practiced today has not reached the stage of perfection that is necessary for stability, and it is far behind the highly perfected system used by the railroads.

Recognition of Inspection System

The far-reaching effects of a well defined inspection system is gradually receiving recognition among automobile manufacturers. At least one maker of a high-priced car is included in the list of those who have been working on such a system. The final inspection methods used at the factory furnish a basis for working out many of the details of an inspection both for the dealer and distributor. The inspection sheet as shown here is issued by the Lincoln factory to its factory distributors. It is a good example of what can be done in making up a chart that will fully cover the points that govern the operation of the vehicle and in addition those features that have to do with its appearance. A list, or chart, such as this can be used to advantage by the smallest dealer, whether he is engaged in the maintenance of some particular make of vehicle, or general automotive maintenance. Issued in duplicate or in triplicate, an inspection chart is invaluable to the maintenance station, because it tells instantly the degree of fitness of each car that has entered his station.

It provides a tangible basis for soliciting repair work by enabling the dealer to inform the owner of certain maintenance that should be performed in order to keep the car in first class

Service Inspection Report

To be made every 1,000 miles for 3,000 miles

Owner's name and address.....

Date

Car No Engine No.....

Mileage

1. Is radiator full?.....
2. Is anti-freeze required?.....
3. Is water hose in good condition?.....
4. Are all water joints tight?.....
5. Does engine cool properly?.....
6. Is fan belt tight?.....
7. Are syphon and shutters functioning properly?.....
8. Does engine timing chain need adjustment?.....
9. Are engine rear supports tight?.....
10. Does carbureter function properly?.....
11. Does carbureter need cleaning?.....
12. Is compression good in all cylinders?.....
13. Are all valves properly adjusted?.....
14. Should valves be ground?.....
15. Should carbon be removed?.....
16. Has engine normal power?.....
17. Are gasoline screens clean?.....
18. Does carbureter choke properly?.....
19. Does vacuum tank function properly?.....
20. Does oil level indicator register "Danger"?.....
21. Should oil be changed?.....
22. What is oil pressure, engine idling?.....
23. Is oil clean?.....
24. Are all spark plug gaps correct?.....
25. Condition of plugs? Cyl. 1..... 2.....
3..... 4..... 5..... 6..... 7..... 8.....
26. Is spark timing correct?.....
27. What is adjustment of circuit breaker points?.....
28. Is ignition distributor clean?.....
29. Is battery watered?.....
30. Are connections good?.....
31. Are hold-down bolts tight?.....
32. What is gravity of each cell? Cell No. 1..... 2..... 3.....
33. Condition of starter commutator and brushes?.....
34. Condition of generator commutator and brushes?.....
35. What is maximum charge rate?.....
36. Is horn properly adjusted and oiled?.....
37. Electrical system free from grounds?.....
38. Are all lamp bulbs good?.....
39. Do headlights focus?.....

40. What auxiliary electrical equipment has been added?.....

41. Were additions properly wired?.....
42. Clutch pedal strike floorboard?.....
43. Are front wheel bearings properly adjusted?.....
44. Are rear wheel bearings properly adjusted?.....
45. Is steering properly lined up?.....
46. Are steering connections tight?.....
47. Foot brakes adjusted?.....
48. Hand brakes adjusted?.....
49. Is torque tube ball and socket joint tight?.....
50. Are snubbers properly adjusted?.....
51. Are spring clips tight?.....
52. Are spring bolts lubricated?.....
53. Are wheel rims true and tight?.....
54. Are tires properly inflated?.....
55. What is condition of tires?.....
56. Make of tires?.....
Left front..... Right front.....
Left rear..... Right rear.....
57. Do springs squeak?.....
58. Are body bolts tight?.....
59. Are there any rattles which need attention?.....

60. What is condition of paint?.....
61. What is condition of enamel?.....
62. What is condition of upholstery?.....
63. What is condition of nickel?.....
64. What is condition of top?.....
65. What is general condition of body and chassis with regard to cleanliness?.....

66. Are there any matters requiring attention not already covered?.....

Signed

By Distributor.

Inspector.

running order. By reference to the filed inspection reports, the condition of a car that the owner wishes to trade in can be easily and quickly ascertained. It is a safeguard to the owner against premature extensive overhauling brought on by neglect of some small point that was sufficient to affect the whole mechanism.

Sequence of Inspection Operations

Attention is directed to the arrangement of the items on the Lincoln inspection sheet. Starting at the radiator, the points to be inspected are arranged in sequence so that the inspector is not required to be constantly moving from one end of the car to the other.

This sheet is issued in triplicate, the original going to the factory, one copy to the car owner and the third copy is filed for the records of the dealer. Only a very few items are listed that are exclusive features with the Lincoln, so that the sheet as it stands can be used as a model to develop a chart for the inspection of any make of vehicle.

Careful study is shown in the listing of several of the items which should be included on every inspection sheet; they are the items numbered as follows: 17, 20, 21, 22, 23, 24, 29, 30, 31, 35, 39, 40, 41, 43, and all items from No. 60 to No. 66.

According to the Lincoln distributor, adherence to the sheet has been a big factor in keeping the cars on the road and reducing the number of men required in the maintenance department. The first three inspections are free and occur at 1,000-mile intervals. After the first 3,000 miles have been covered, the owner is expected to pay for whatever service is rendered. The idea of providing the first three inspections at no cost to the owner reacts favorably for all concerned. The first 3,000 miles of a car's life are the miles that are most important to both dealer and owner. The various units and moving parts of the vehicle have by that time reached the stage where they are thoroughly seated and positioned in relation to each other, and if the vehicle has been under proper care, the final adjustments can be made at the termination of the 3,000-mile period.

The chart has produced such beneficial results that to date no car has required overhauling due to faulty adjustment during the first 3,000 miles of running. The majority of Lincoln owners have taken kindly to the inspection system and have acquired the habit of inspection. There is no reason why the same habit cannot be instilled into the mind of every motor vehicle owner if the proper educational methods are directed at him.

China—American Service Station Needed in Canton

There is an opening in Canton for an American firm handling several American cars, trucks, and motorcycles, and operating an up-to-date service supply station. The one firm now handling American cars does not operate either service or supply station, and none of the 30 garages in the city are equipped to supply extra parts or do first-class repair work. Nearly all of the 24 passenger cars, 4 trucks, 15 busses, and some 30 odd motorcycles in Canton are of American manufacture.

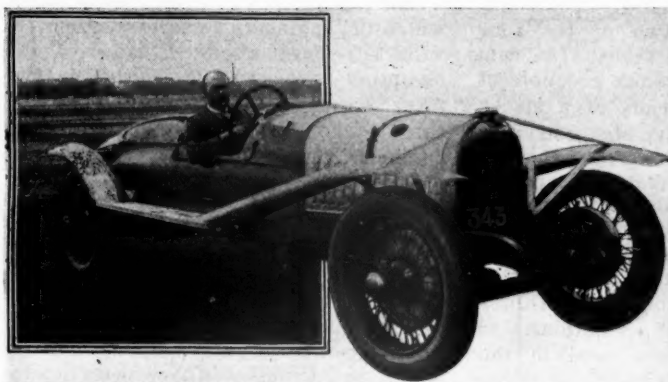
United Kingdom—Improvements on Motor Cars

A British firm has put on the market a strong electric projector to be attached to the offside running board of a car for use in facilitating the passing of two cars at night. Thus, by means of a two-way switch, two motorists passing at night light the way for each other and eliminate the danger arising from dimmed lights.

Cars Increase Salesmen's Profits 40 to 100 Per Cent

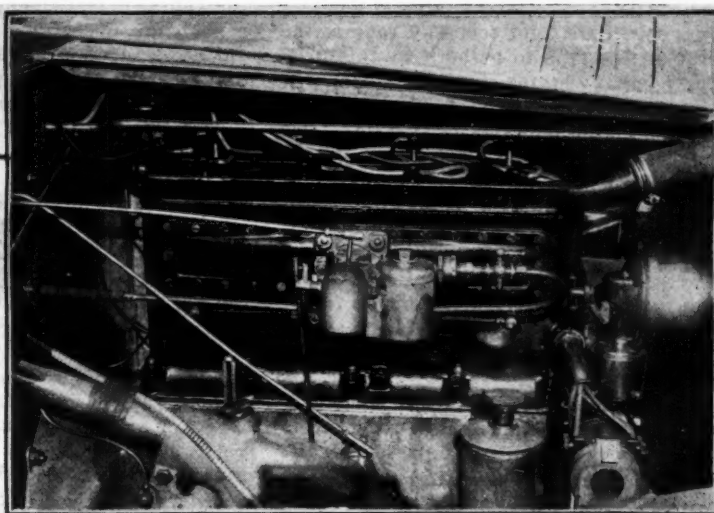
"We have demonstrated that each salesman's sales increase from 40 per cent to 100 per cent as soon as he begins to operate a motor car," writes E. D. Voorhis, General Sales Manager of the H. D. Lee Mercantile Co., in a recent issue of *System*.

"This is because he makes from six to eight towns a day where he formerly made from one to four; and it gives him the additional advantage of being able to carry along with him a quantity of advertising matter which he can place to the best advantage at strategic points."



Above—Duray in the Voisin, the car which finished one, two and three in the fuel economy race.

Right—A knight type of engine is used in the winning Voisin. A Zenith magneto and Delco distributor are located at the front of the engine, giving two sets of ignition.



Some More Grand Prix Race Car Details

European Designers Work Out Some Interesting Features in the New 122 Cu. In. Engines, Which is the Limit Set for Entries in Next Indianapolis Event

IT is the custom of the Automobile Club of France to change its racing rules at frequent intervals, with the prime purpose of developing engine and chassis design and opening up new fields of research. This year the requirement of the Grand Prix race was that engines not exceed 122 cu. in. displacement. This is the size announced for the next Indianapolis race.

In the July 20 issue of *MOTOR AGE* appeared a cable account of the French Grand Prix at Strasbourg, which was won by Feliz Nazzaro in a 122 cu. in. Fiat. This story included a brief description of the winning car. The second day's event, consisting of a fuel economy test over practically the same course, was won by a Voisin car, which, by the way, finished one, two and three. The race was based on a limited amount of fuel. A cabled account of this race was published in the same issue, together with a brief mechanical description of the winning Voisin. Naturally there were some interesting designs worked out for both of these events, and some of the more important are presented on these pages.

Competitors in the 122-cu. in. Grand Prix race were Ballot, Rolland-Pilain, Bugatti, Slim-Pilain and Mathis representing France, Sunbeam and Aston-Mar-

tin from England and Fiat from Italy. With the drop to 122 cu. in. the eight-ahead engine lost its numerical superiority. It was used by Rolland-Pilain and Bugatti only; Fiat used a straight six engine and the others had four cylinders.

Bugatti 8-Cylinder Engine

Bugatti raced with a type of eight-ahead engine shown to the public at the last Paris show, but evidently never put into production. There are a number of new and patented features in the car, some of which were tried out for the first time in the race. The cylinders, which measure 2.36 in. by 3.56 in. bore and stroke are a single casting with separate head, this latter receiving three valves per cylinder, the single exhaust valve measuring 2.26 in. and the pair of intake valves each having a diameter of less than 1 in. The overhead camshaft drive is at the front, the water and oil pump drive is by means of a cross shaft at the foot of the vertical shaft and the two magnetos are at the rear and driven directly off the camshaft. The crankshaft is carried in ball bearings, with plain bearings for the connecting rods.

Sunbeam 3-Piece Front Axle

Bugatti's distinctive type of quarter elliptic rear spring, with the thick end rearwards, is used. Among the peculiarities is the use of compressed leather for most of the steering connections. Brakes are fitted on both front and rear wheels, a feature of the design being that no adjustment is required, for the brakes

maintain their full efficiency until the lining is completely worn down.

The Sunbeam cars are a development of the 1500 cc. Talbot Darracq cars which were so successful last year, these companies having been consolidated. The four cylinder engines of 2 $\frac{3}{4}$ by 5 $\frac{5}{16}$ in. bore and stroke have ball bearings shafts with plain bearings for the connecting rods and four valves per cylinder, operated by a train of spur pinions and two overhead camshafts. One of the distinctive features of the Sunbeams is the adoption of a three-piece front axle, the center portion between the road springs being I-section and the two extremities being cylindrical. This design has been adopted in order to avoid the torsion of the front axle under heavy braking stresses.

The Rolland-Pilain cars, described recently in *Motor Age*, with eight cylinder engines of 2.32 by 3.93 in. bore and stroke, were run in the race with the ordinary method of valve closing by means of coil springs. It appears that the system of positively and mechanically closing the valves has not yet given the results expected of it. These engines are of the two-valve type, with the valves at an angle of 160 deg. and the spark plug in the head. Magnesium pistons are used, produced in France under the German process known as Elektron.

Ballot Cars Lighter

Ballot this year raced with the same type of car as run in last year's events. Some reduction has been made in weight, the engine has been speeded up and more attention has been given to stream lin-

ing. The sleeve-valve engine entered by Peugeot in the fuel economy race is the first of this type to be built by this firm. The company states that this model will be put on the market next year. The engine has four cylinders in a single casting of 3.75 by 5.12 in. bore and stroke, with a five plain-bearing crankshaft and plain bearings for the connecting rods. Delco ignition is used with the distributor at the front end driven off the same shaft as the water pump. With crankcase webs brought right up to the frame members and the dash a close fit to the clutch housing, a particularly neat engine is secured.

The new Peugeots have unit construction engine and gearbox, left hand steering with center control, four speeds and reverse, semi-elliptic springs front and rear and front wheel brakes.

Bignan Positive Valve Action

A very interesting feature of the Bignan cars entered in the fuel economy race is the method of positively opening and closing the eight vertical valves in the detachable head. The engineer responsible for this job has departed from previous European practice by the adoption of two vertical shafts, each one of which carries two plate cams, one above

the other, driven in opposite directions, each cam operating two of the four valves grouped around them. The cam operates the valves through a couple of rollers mounted by means of a sleeve construction on the valve stem, one roller being on the upper and the other on the lower face of the plate. No springs are used. This mechanism has given such satisfaction that the firm has decided to adopt it for next year's sporting model. The engineers declare that the ability of the valves to seat no longer constitutes a limit to the number of revolutions.

Magnesium pistons are used in the Bignan engines. The heads have a thickness of about 5/16 in. and there is an entire absence of internal ribbing. The clearance is slightly greater than for aluminum pistons, and the skirt is only a trifle thicker. The bore and stroke is 2 7/8 by 4 7/16 in. It has an exceptionally heavy main shaft carried in a combination of ball and plain bearings. Connecting rods are tubular and the lower cap of the connecting rod bearing is provided with light fins to assist in the radiation of heat. White metal is run direct into the caps. Battery ignition is fitted with the use of a new combined coil and distributor produced by the Italian Marelli Co. The carburetor is a Viel, a new

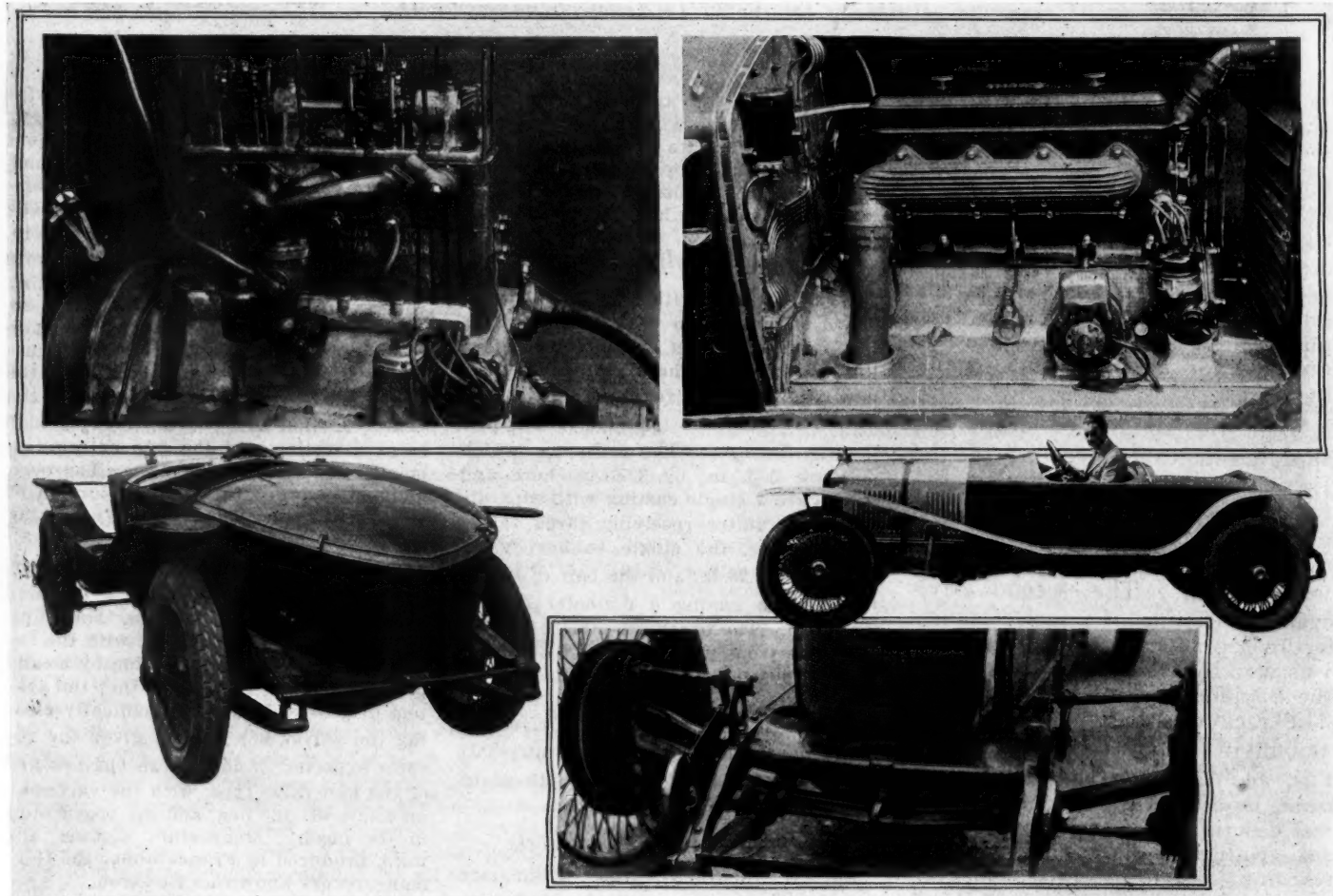
model not yet put into production, with which the engineers declare excellent results have been obtained. Ease of dismounting is one of its distinctive features; either one or other of the two jets can be taken out and changed while the engine is running.

All Aluminum Rear Axle

The Bignan has an all-aluminum rear axle, reinforced with steel tubes. With the 2-litre piston displacement this engine was at a disadvantage under the fuel consumption rules compared with the bigger sleeve valve engines built by Voisin and Peugeot. Other manufacturers started out with the idea of building a 2-litre engine which could be used in the 2-litre Grand Prix and also in the fuel consumption event, but they discovered that a satisfactory engine under a piston displacement rule was unsuitable for a race in which the amount of gasoline was limited.

N. M. A. OPENS OFFICE

WASHINGTON, July 22—The National Motorists Assn. has opened headquarters in this city in the Edmonds Building at 911 Fifteenth st., N. W. A touring and information bureau has been established the use of which is extended to all



Upper Left—The engine in the Bignan has a novel means for actuating the valves. There are four cams for eight valves, each being mounted on a vertical shaft.

Lower Left—Rear view of the Bignan, showing how air resistance was reduced.

Lower Right—A rather unusual front axle construction, consisting

of an I-beam center piece with tubular end pieces, is used on the Sunbeam to reduce torsional stresses in braking.

Upper Right—The Knight type of engine used in the 2-litre Peugeot. Note how the crank case extends to the frame side rails, making a Center Right—Andre Boillot in the Peugeot four-passenger 122 in. car which ran in the fuel consumption race. This car has a body of wood.

This List Will Be a Time Saver When an Electrical Problem Comes Up on Any of the Cars Described

The following electrical systems have been described in previous issues:

Car	System	Issue	Car	System	Issue
1921 Ford	Ford	Nov. 10, 1921	1921 Chevrolet FB & 4-90	Auto-Lite and Remy	Mar. 9, 1922
1921 Dodge	North East	Dec. 1, 1921	Maxwell 1920, '21, '22	Simms-Huff & Auto-Lite	Mar. 23, 1922
1921 Buick	Delco	Dec. 15, 1921	1921 Oldsmobile Six, 37-A and B	Remy	Apr. 13, 1922
1921 Overland	Auto-Lite	Dec. 29, 1921	1921 Oakland, 34-C	Auto-Lite and Remy	Apr. 27, 1922
1921 Studebaker	Wagner and Remy	Feb. 16, 1922	1921 Oldsmobile, 4 & 8 Cyls.	Delco	May 18, 1922
			1921 Hudson	North East	June 8, 1922
			1921 Reo and Speed Wagon F	Auto-Lite and Remy	June 29, 1922
			1920, 1921 Chalmers	American Bosch	July 13, 1922
			1921, 1922 Chandler		

Wagner Electrical System on 1921 Nash Cars

This Article Takes in Both the 6 Cylinder Models and the
4 Cylinder Model Made in 1921

ARTICLE FOURTEEN of a Series by A. H. PACKER

NASH cars in 1921 included three models, of which two were six cylinder cars, while the other was a four. The electrical system was the same on both the six cylinder models, and will be herein described. The four cylinder electrical layout was so similar, however, that the wiring diagram and descriptions will also apply if a few slight differences are kept in mind.

On the six cylinder models the starting motor was mounted on the right side of the engine and had Bendix drive to the flywheel, while on the four cylinder engine the starter was mounted at the left, and instead of the Bendix, it had a manual shift operated by the starter pedal. The starting switch on the four was located on top of the starting motor and was actuated by the same mechanical movement that shifted the gear into mesh with the flywheel teeth, contact being made, however, only after the teeth were well in mesh.

On the four cylinder model the fuse box is replaced by a junction box and a circuit breaker for the lighting current is mounted on one of the ammeter terminals.

Wiring of Six Cylinder Models

In Fig. 1 is shown the wiring diagram of the six cylinder cars, the internal as well as external circuits being given for convenience in tracing any particular circuit. In Fig. 6 is shown an enlarged view of the back of the lighting and ignition switch, which is incorporated in the same panel with the ammeter. The internal action of the switch is such as to supply current which comes from the ammeter to the "Ign" terminal when the ignition switch is turned on. When the lighting switch is turned to the "On" position, connection is made to the Dash and Tail terminal and to the Large Head terminal, thus giving current to the large bulbs in the headlights. In the Dim position of the switch current goes to the small headlamp bulbs instead of the large ones, while the connection to the tail lamp is the same. All other circuits should be self-evident from the diagram.

Starter Circuits

Internal circuits for the starting motor are shown in Fig. 2, the live terminal being at the drive end of the motor, while the ground terminal is at the commutator end, and in line with the other terminal, although shown a little to one side in the sketch, for the sake of clearness. Rotation is clockwise from the commutator end, which, with the gear reduction in the starter itself, makes the rotation of the Bendix shaft also clockwise from the drive end.

Tracing the starter current in Fig. 1 from negative battery to starter switch and through it to the live terminal, we can

then refer to Fig. 2, where we see that the current goes through the two coils at the left to the brushes at the sides. Current then goes through the armature to the upper and lower brushes and from these through the other field coils to the ground terminal.

LUBRICATION of the starter is by means of an oiler at the commutator end and a grease plug in the gear housing in which the use of "Gredag," a graphite grease, is recommended.

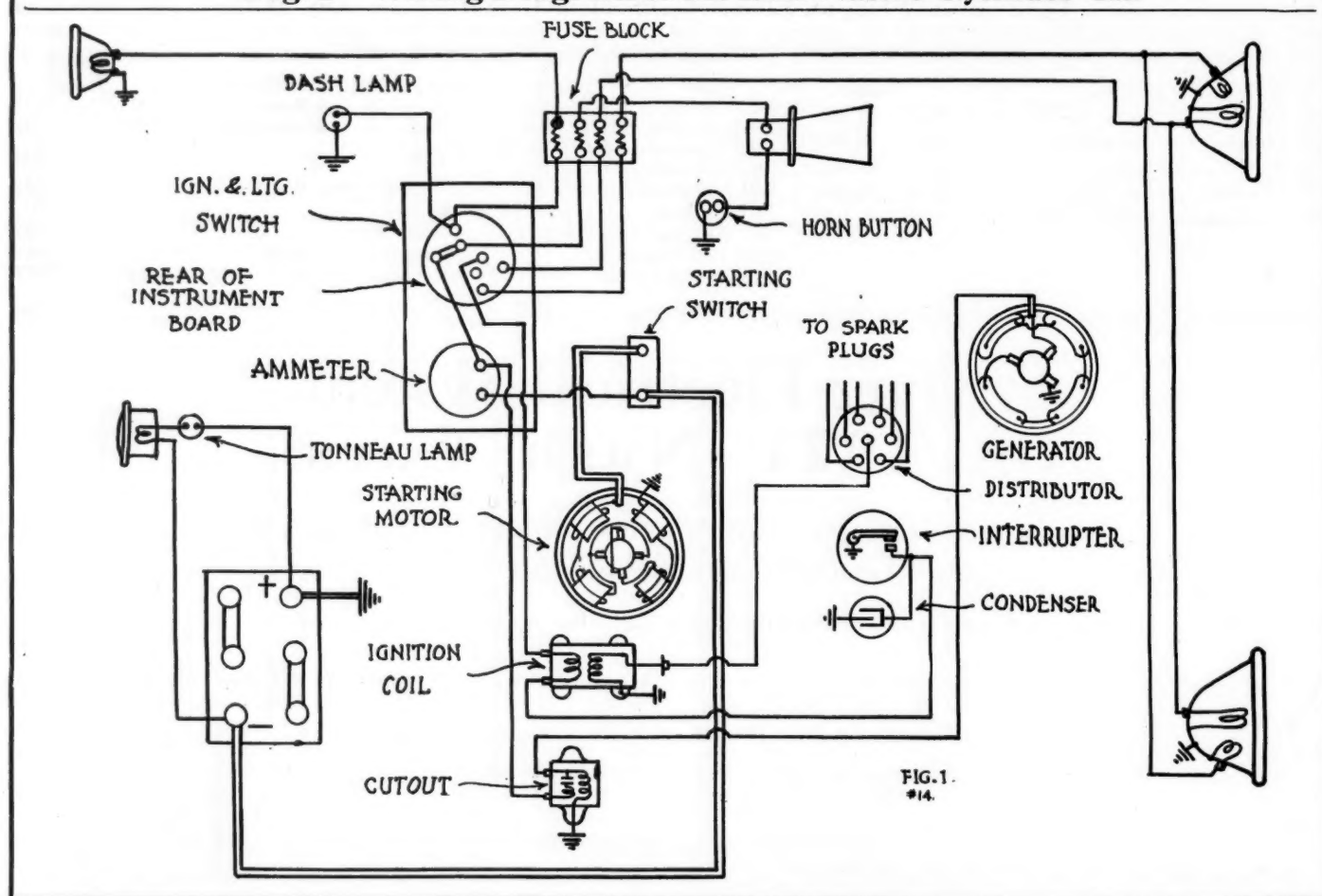
Shooting Starter Trouble

Failure of the starter to crank the engine may be due to trouble in the battery or wiring or in the starter itself, so that it is advisable to locate the trouble definitely before removing the starting motor for inspection and repair. Exact determination of the cause of starter trouble is usually facilitated by turning on the lights and observing their action when the starter pedal is operated.

LIGHTS GOING OUT shows a poor connection in the starter circuit which may not be bad enough to keep the lights from working when the starter current is not flowing. Such trouble is usually to be found at the battery terminals, which may be corroded from acid working up onto the contact surfaces where the cables connect with the battery terminal posts. Another likely location for this sort of trouble is where the battery is grounded to the frame of the car. To determine which of these places is really giving the trouble, it is best to use a voltmeter connected across the suspected contact while the starter button is held down, as current flowing through a high resistance can always be detected by a voltage reading. With connections O. K. there will be a barely perceptible movement of the voltmeter needle, but if the contact is poor, the meter may read a volt or two, which shows the terminal should be removed and the surfaces cleaned up with sandpaper. Another way of finding the defective connection is by holding the starter button down for a few moments and feeling the various connections to see if they are getting hot, but the voltmeter method is the most reliable.

LIGHTS STAYING THE SAME when the starting pedal is operated shows the existence of an open circuit, which can best be located with a six-volt test lamp having separate leads which can be connected, one to the frame of the car and the other to various parts of the starting circuit while the switch is held down. This free test lead should first be touched to the live battery terminal and the lamp should light. It should then be touched to the battery side of the starter switch, then to the other switch terminal and finally at the live ter-

Fig. 1—Wiring Diagram of the 1921 Nash 6 Cylinder Car



minimal of the motor itself. If the lamp lights every time, it shows the trouble to be in the motor itself. Otherwise the open circuit is in between the last place where the lamp would light up and the first place where it failed to do so.

If the trouble seems to be in the motor, another test can be made by removing the cover over the commutator and applying a little extra pressure to the brushes with the fingers while someone else steps on the switch. If this causes the starter to work O. K. it shows that new brushes are required, as the old ones are apparently worn down to the point where they no longer make good contact with the commutator. This will of course require removal of the starter, and when the new brushes are installed it is also usually well to turn down the commutator.

LIGHTS GETTING VERY DIM when the starter button is operated shows either that the battery is discharged or that there is mechanical or electrical trouble in the motor, which permits its taking a very heavy current from the battery without developing much effective torque. The battery can be tested with a hydrometer, readings of 1280 in the different cells showing that the battery is fully charged, while 1150 shows a discharged condition.

It is also well to check these readings with a voltmeter reading on each cell, as hydrometer readings are of no value if heavy acid or battery dopes have been added. With starter current flowing, the readings on each cell should be in the neighborhood of 1.9 to 2.0 volts per cell if the battery is in good condition, and normal starter current, only, is being taken from the battery. If the readings on individual cells are 1.6 to 1.7 volts it shows the battery to be in a discharged condition, while a very low reading on any cell or a reversed reading would show that particular cell to be shorted, which would require reinsulating of the whole battery.

With a new battery fully charged it is possible to obtain readings as low as 1.7 in case there is trouble in the starter which makes it take an abnormal current, so that it is well

to also check this by putting a high reading ammeter in series with the starter circuit, and if it reads over 200 amperes, there is no doubt a short or mechanical trouble in the motor, as the average engine requires only about 150 amperes to crank it.

Removing and Repairing Starter

In case it is found necessary to take the starting motor off, it is only necessary to disconnect the cable and remove the large screw that acts as a set screw. This is in the flywheel

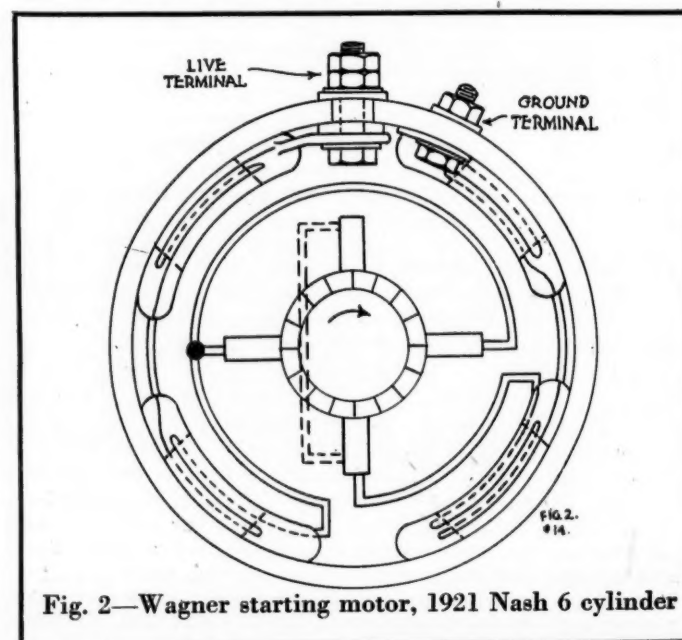


Fig. 2—Wagner starting motor, 1921 Nash 6 cylinder

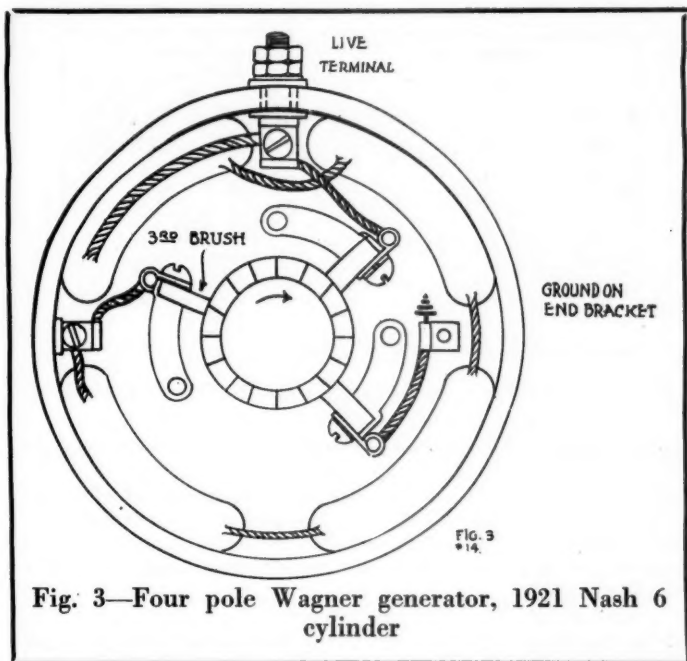


Fig. 3—Four pole Wagner generator, 1921 Nash 6 cylinder

housing just over the drive end of the starter. With this removed the starter can be pulled out, as it is just a good sliding fit in the flywheel housing.

When the starting motor is inspected, the condition of the bearings should be examined, as if these are worn they may allow the armature to rub on the pole pieces. The commutator bars should be examined to see that the armature conductors are tightly soldered in, and if the commutator is badly burned it should be turned in a lathe and polished with sandpaper. A 110-volt test lamp can be used to test the armature and brushes for grounds, as these would account for drawing a heavy current without producing much torque, and when this test is made on the field coils the natural ground will have to be disconnected.

Generator

The generator is mounted at the front of the engine by means of two large cap screws and also acts as the fan shaft, both the fan and the generator being driven by means of a V-type belt, the tension of which is adjustable by loosening the cap screws that hold the generator and sliding it up until the proper tension is attained.

Two types of generators have been used, although they are mechanically interchangeable. One is the four-pole machine shown in Fig. 3 while the other is a two-pole machine shown in Fig. 4. Both of these have third brush regulation and have similar characteristics. Both of these sketches show the internal circuits from the drive end, which on these machines is also the commutator end. The cutout which operates to connect the generator to the battery and also to disconnect it when the engine stops is shown in Fig. 5, while the complete generating circuits can be traced in the wiring diagram in Fig. 1.

Shooting Generator Trouble

In either generator the field circuit is from the main brush that is not grounded through all the field coils to the third brush, and with the generator in good condition, running the engine should cause it to generate and then send current from its terminal to the cutout, and through the fine winding to the frame of the cutout which is grounded, thus giving a return circuit to the generator. As the speed increases and the voltage becomes high enough, the current through the fine winding of the cutout should close the contacts, allowing current to flow to the ammeter and through it to the starting switch and through the heavy cable to the battery.

Belt Slipping

If the ammeter does not indicate that the generator is charging the battery the first tendency is to pull the generator off,

but the trouble may not necessarily be there. One possibility is that the belt which drives both the generator and the fan is slipping, and to check this roughly is fairly easy, for it is possible to judge this condition by noting the breeze from the fan when the throttle is quickly opened. The engine will of course instantly increase its speed, and the breeze from the fan should at the same time become much stronger. If the belt is slipping, however, it may stay about the same, which serves as an indication of such a condition.

Cutout Trouble

It is also possible that the trouble is in the cutout, and as this may be sealed up by a drop of solder holding the cover, it can be shorted with a pair of pliers, while the engine is not running. This should normally send a current from the battery to the generator, trying to run it as a motor, and should show a discharge on the ammeter of about 15 to 20 amperes. It should also show a slight tendency to turn the generator by causing the belt to slip, but if it succeeds in slipping the belt this also is an indication that the belt is too loose.

If no current flows when the cutout terminals are connected together it shows an open circuit somewhere, which can most easily be located with a test light connected from the frame of the car to various parts of the charging circuit. If the lights are working all right the free lead from the test lamp could be touched to the two ammeter terminals and then to the "Bat" terminal of the cutout. If this is alive, as indicated by the lamp lighting up, the next test should be made at the generator terminal with the two cutout terminals shorted as before. If the lamp lights up at the generator terminal and yet no current flows through the generator it shows an open circuit inside of the machine, this being a rare occurrence, however.

Motoring Test on Generator

Running a generator as a motor often reveals the nature of internal trouble, and with the belt drive it is especially easy to make this test, for the two cap screws that hold the generator can be loosened and the generator dropped until there is no drag due to the belt. Shorting the cutout terminals together should now allow the generator to motor, drawing a current of 5 or 6 amperes, which if the generator is held so that it cannot turn, will come up to 15 or 20 amperes. Should there be no tendency to turn, however, and the current drawn be rather heavy, that is, 15 or 20 amperes, it is probably due to an open circuit in the field, or due to the third brush not touching the commutator, while if the current is only three or four amperes and there is not tendency to turn, the trouble is not due to the field but to the armature or failure of one of the main brushes to make contact with the commutator.

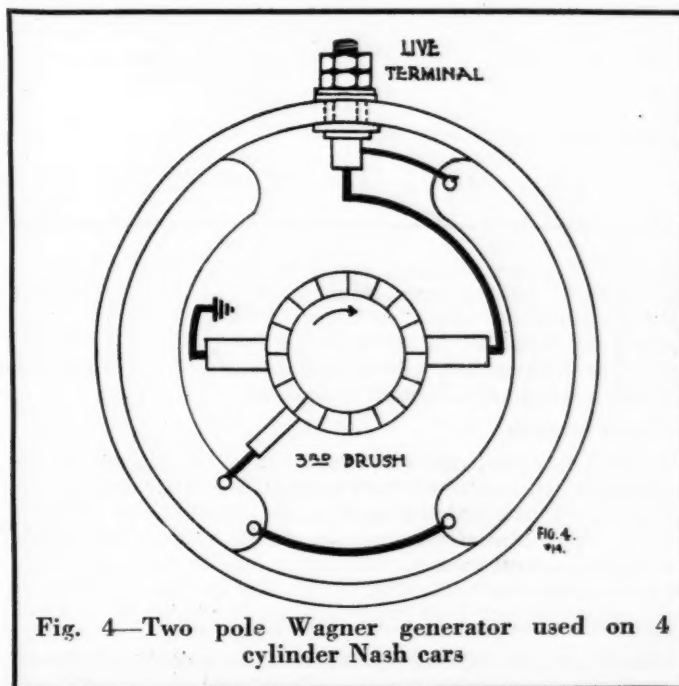


Fig. 4—Two pole Wagner generator used on 4 cylinder Nash cars

By carefully tracing the generator circuits in Fig. 3 and Fig. 4 it will be seen that failure of the live main brush to touch the commutator will open the armature circuit. Failure of the third brush to touch will open the field circuit, while failure of the grounded main brush to make contact with the commutator will prevent all current from flowing through the generator.

Should the generator motor, but draw a heavy current which would give an unsteady reading on the ammeter, it is a nearly certain indication that the armature is shorted or grounded. If the generator runs as a motor, drawing only 5 or 6 amperes, it is probably O. K., and the belt should again be tightened for making another test.

After the belt has been tightened, the two cutout terminals should again be connected, which will draw a heavy discharge current, and the engine should be started and its speed gradually increased. This should cause the discharge current showing on the ammeter to decrease to zero and then show up on the other side of the ammeter as charging current, further increase in speed giving a charging current of 12 or 15 amperes, depending on the setting of the third brush.

If the generator will show charge under these circumstances but will not cut in by itself, test should be made with a voltmeter to see whether the fault is in the generator or in the cutout. The voltmeter can be connected from the generator terminal to the frame of the machine while the engine is running and if a reading of 8 volts or more is obtained there is no good reason why the cutout should not work unless it is defective or there is a break in the wiring. The voltmeter reading should next be made from the "Gen" terminal of the cutout to the shell of the cutout and the indication should be the same as obtained at the generator. If there is no reading here there is a break in the wire from the generator or else the cutout is not grounded, but if the voltage at the

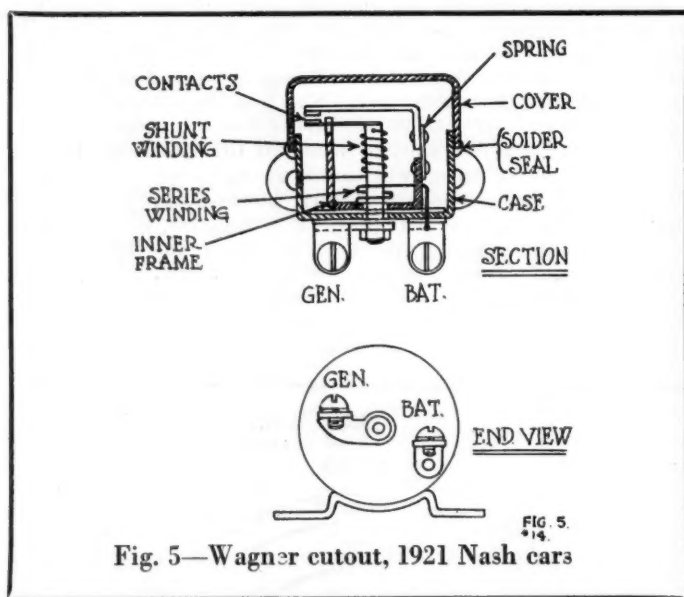


Fig. 5—Wagner cutout, 1921 Nash cars

cutout is O. K. a new cutout should be tried, as the one on the car probably has an open shunt winding. If a test on the shunt winding is desired, however, it can be made by connecting the voltmeter in series in the line from the generator, and if no reading is obtained with the engine running, then the fine winding in the cutout is broken.

Lighting Circuits

Current for the lights comes through a heavy cable to the starting switch and from there through a smaller wire to the ammeter, through which it goes to the Ignition and Lighting switch. From the same connection on the Ignition and Lighting switch current goes out through a fuse to the horn, while other terminals on the lighting switch feed current out through fuses to the tail and dash lamps and the two bulbs in the head lamps.

Trouble in the lighting circuits can be quickly diagnosed by studying the circuits, for one bulb in head lamps being out

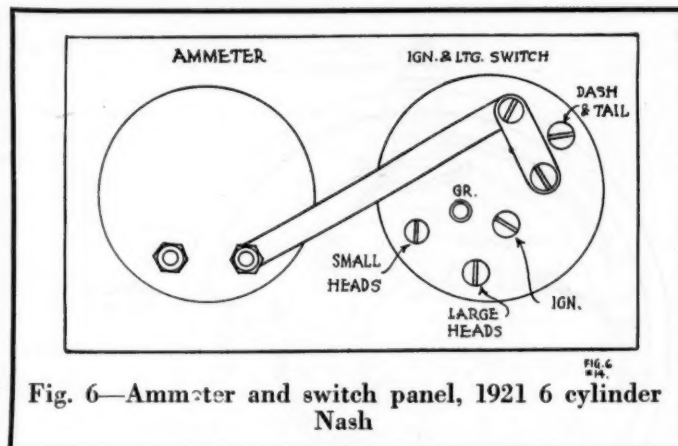


Fig. 6—Ammeter and switch panel, 1921 6 cylinder Nash

could not possibly be due to a blown fuse but would be more likely caused by poor contact in the socket or connections or due to the bulb itself being blown out. On the other hand, both large head lamp bulbs being out would most likely be due to a blown fuse or other condition in the main wire to both lamps.

In case a fuse is found to be burned out a new one should not be installed without first testing for a ground in the lighting circuit supplied by that fuse. To test for ground, the tail lamp plug should be removed from the lamp socket, assuming it is the tail lamp fuse that is blown, and instead of a fuse in the clips, a test lamp should be connected across the clips. If the circuit is grounded, this test lamp will light up, and can be watched while the tail light wire is twisted and pulled in an attempt to find out where it is rubbing on the frame of the car. If no trouble is evident, the plug can be put back in the socket and if everything is normal the tail lamp bulb and the test lamp bulb will both light up to about half brightness. FOR THIS TEST THE TEST LAMP BULB SHOULD BE THE SAME SIZE AS THE TAIL LAMP BULB. Should the tail lamp bulb be grounded in its socket, however, it will go out and the test lamp bulb will burn at full brightness. If the trouble is of an intermittent nature, however, the test lamp bulb may flicker between half and full brightness, while the tail lamp will flicker between half brightness and being out. After one is sure that there is no ground in the circuit affected it is safe to put in another fuse, but unless a test is made it is quite likely that the new one will merely burn out as soon as installed.

Locating Ignition Trouble

If no sparks are obtained at the plugs it is well to turn on the ignition switch and observe the indications of the ammeter while the starter is cranking the engine, as it should show first about 5 amperes and then zero as the interrupter points close and open, or if the engine is being cranked fairly rapidly, the ammeter will not have time to read the high and low current but will indicate a sort of average, or about 1.5 or 2 amperes, with a slight flicker to the indication.

Should the indication be 5 amperes steadily while the starter is cranking the engine it indicates either that the interrupter points are stuck together or that the insulated contact is accidentally grounded or that the wire from the coil to the interrupter is grounded. Should the indication be zero all the time, however, it shows that the circuit is open, and the exact location of the trouble can easily be found with a six-volt test lamp connected from the frame of the car to various parts of the ignition circuit. In making these tests it is well to start at the battery and work along the ignition circuit toward the interrupter, for the circuit should be alive to ground or the frame of the car and should make the test lamps light up. Should there be a break in the circuit, however, the lamp will not light up on the side of the break away from the battery, so that THE OPEN CIRCUIT WILL BE IN BETWEEN THE LAST PLACE WHERE THE TEST LAMP LIGHTS AND THE FIRST PLACE WHERE IT FAILS TO DO SO.

Locating Condenser Trouble

If the primary circuit seems to be O. K., the interrupter making and breaking the circuit as it should, it is possible

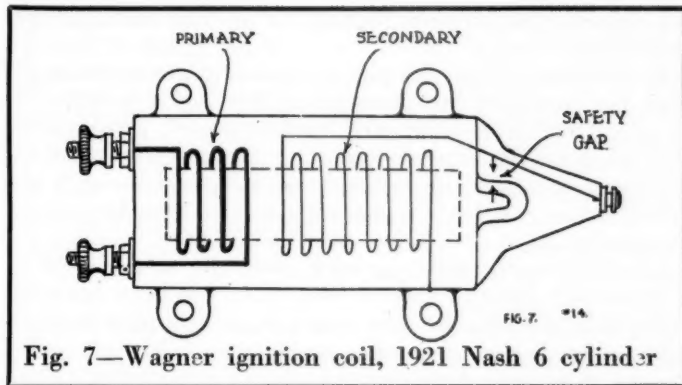


Fig. 7—Wagner ignition coil, 1921 Nash 6 cylinder

that the coil is defective or that the condenser is shorted. To test for shorted condenser, the interrupter points should be blocked open with a piece of match or paper and the ignition switch turned on and off while watching the ammeter carefully. With everything O. K. there should be no indication on the meter, but if there is a slight leak it may show up in a slight movement of the ammeter needle. Sometimes, however, the condenser may be defective enough to affect the ignition but not enough to show up on the meter, so that the best test is to connect a voltmeter in series with the ignition circuit and repeat the above test. Then with a defective condenser there will be a big deflection on the voltmeter when the switch is turned on, but no reading with a good condenser under similar conditions.

If the primary circuit and the condenser are both O. K., a new coil should be tried, as there is no test for coil trouble except that one may not work while another one will, this being due to the fact that trouble which kills the spark is not

in the wire of the winding but in the paper insulation that ordinary methods will not test.

The internal coil circuits are shown in Fig. 7.

Timing the Ignition

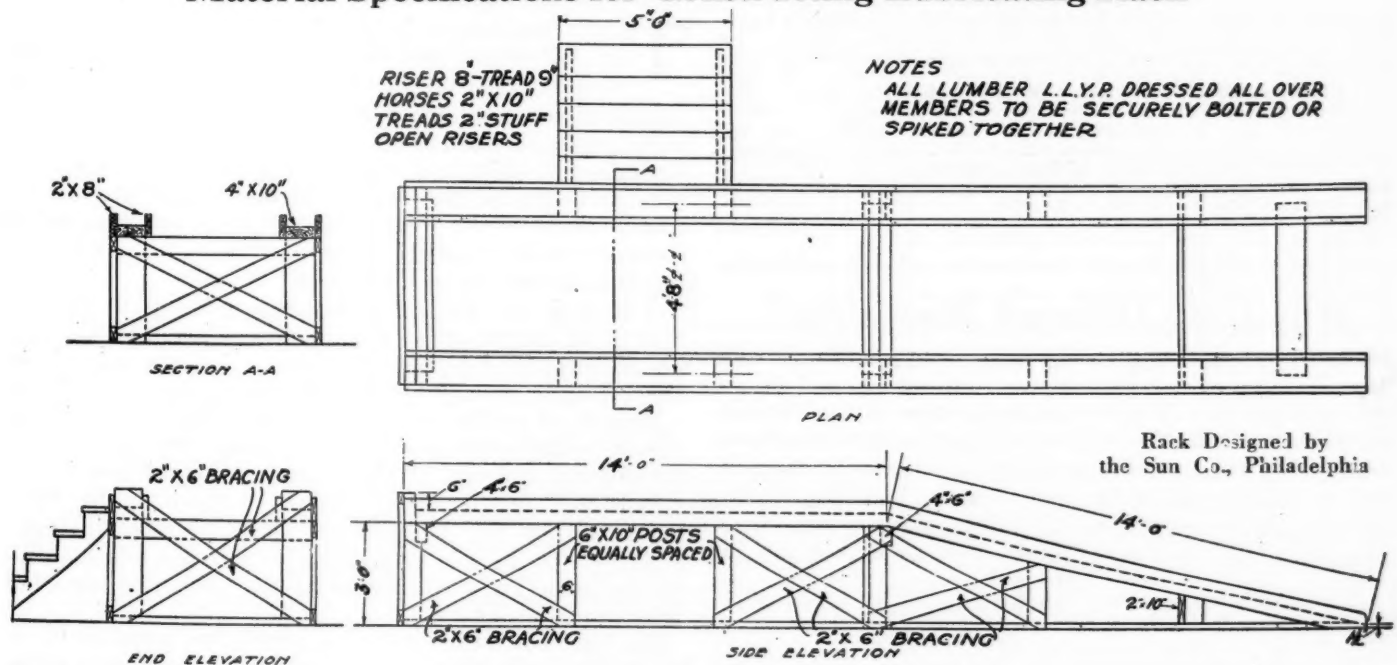
Should it become necessary to time the ignition, it can be done by means of the adjustable cam in the interrupter. This can be loosened by lifting off the distributor cap and distributor arm and loosening the screw in the center of the shaft. A screwdriver can then be used under the cam to pry it loose.

To set the engine, the spark plugs can be removed from all but the No. 1 or front cylinder and the engine turned over by hand until the compression is felt on the No. 1 cylinder. The No. 1 spark plug can now be removed and the engine cranked carefully until the piston is at top dead center. This position can be checked by the flywheel marks, "D. C. No. 1 and No. 6," which can be seen at the inspection hole in the flywheel housing.

With the engine set on No. 1 firing dead center, the distributor arm should temporarily be replaced and turned until the distributor brush is under the wire going to the No. 1 spark plug. The timing lever on the steering column should be retarded and, for greater accuracy, the interrupter points should be watched to see that the action of the cam against the fiber bumper is such that the points are JUST READY to open.

The distributor arm can now be removed and the cam tapped lightly with the handle of the screwdriver to keep it from slipping when the screw is tightened. The screw can now be tightened and the distributor arm and cap replaced. The careful electrician will also give the engine a final check to see that after everything is set, the interrupter points open as indicated by the ammeter reading, when the engine is turned two revolutions so as to again be on firing dead center of the No. 1 cylinder.

Material Specifications for Constructing Lubricating Rack



Sills:

4 pcs. 2" x 10"—14' long	93'-4"
1 " 2" x 10"—12' long; cut 1 Pc. 5'	20'-0"
Use remainder for Cross pc. near end of incline	
1 " 2" x 10"—10' Cut 2 Pcs. 5'	16'-8"

Posts:

1 pc. 6" x 10"—12' long; cut 6 pcs. 2'-10"	60'-0"
1 " 6" x 10"—8' " and 2 pcs. 4'-0"	40'-0"
1 " 6" x 10"—6' "	30'-0"
1 " 6" x 10"—6' " cut 2 pcs. 2'-0"	30'-0"
cut 2 pcs. 1'-0"	

Cross Pieces:

1 pc. 4" x 6"—12' long; cut 2 pcs. 6'-0"	24'-0"
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Board Feet

Rails:

4 pcs. 4" x 10"—14' long	186'-8"
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Side Rails:

8 pcs. 2" x 8"—14' long	149'-4"
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Cross Bracings:

5 pcs. 2" x 6"—12' long; cut 10 pcs. 6'-0"	60'-0"
3 " 2" x 6"—14' long; cut 6 pcs. 7'-0"	42'-0"

Stair:

1 pc. 2" x 10"—12' long; cut 2 pcs. 6'	20'-0"
1 " 2" x 10"—10' " " 2 " 5'	16'-8"
1 " 2" x 10"—16' " " 3 " 5'	26'-8"

Total.....815'-4"

Notes: All lumber, long leaf yellow pine dressed all over. Members to be securely bolted or spiked together.

MOTOR AGE

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Why Have Different Wire Sizes?

SOME boys were playing near an excavation in the city streets. A few were running up and down a long trench that paralleled the curb. Others were having fun in a large sand pile while still others were giving their clothes a whitening coat with piles of cement that lay in sacks ready for the next day's job. Close at hand were pipes of various sizes, some large enough to crawl through, others four or five inches in diameter, and the boys were using the larger ones to good advantage, making them serve as tunnels to imaginary caves.

Play and the romance of adventure filled their thoughts and none considered the reason for the pipes of various size nor why the different kinds were needed. To the older folks passing on the street car, the practical side of the work made a more definite appeal, but these also were mainly unaware of the underlying reason for the variation in size of conduit being used.

The farmer who fixed the barn door for the cats had an idea of the general requirements, for he made a large hole in the door so that the large cat could get in, and then made a small hole for the small cat. He, of course, overlooked one important fact and did needless work, but nevertheless conceived that the greater

the object to be accommodated, the greater the capacity should be.

In the flow of water in pipes, engineers are acquainted with the fact that the pressure at the outlet is reduced by the friction encountered as the water rubs along the inside of the pipe and that to reduce this action as much as possible pipe sizes must be great enough so that the flow can be at moderate speed and the loss comparatively small.

The flow of electrical current, as in the case of water, is governed by the size of the wire. Where current must flow rapidly, the wire must be accordingly larger, just as the water pipe must be bigger. This accounts for the difference between the size of the starter cable and the ignition wire, and can be figured as accurately and practically as easily as the carpet area can be calculated when the room dimensions are known.

Most mechanics are afraid of this rule because it is known as Ohm's law, and because it uses terms such as amperes and volts, and for this reason they fail to become acquainted with its method of operation and limit themselves accordingly. Why not brush up on the fundamental electrical principles? The motor car would be dead without electricity and will no doubt continue to use electrical devices more and more, and he who makes no effort to pick up all possible electrical information may find himself far behind the procession.



A guarantee should be for economical transportation, not on parts of the vehicle.



A New Form of Fraud

THE recent split in the American Automobile Association and the formation of the National Motorists Association appears to have started in the minds of some salesmen visions of opportunity of garnering great wealth from the motorists of this country. From many cities and many parts of these cities there come reports to MOTOR AGE of new motorist associations. Some of these are local and some are national in their ambitions. Some offer facilities for a national touring service for as little as \$5 a year.

The task of building a national association for the benefit of motorists is a tremendous job. It will not be accomplished by an unknown promoter who is in the business chiefly for his personal gain. It will be a growth of public opinion, and those who are wise in motor organization are now watching the two organizations formed out of the recent split and wondering which will be the one. There is much to be done before either will be national in its membership and activities, so there is little doubt as to what will become of the many upstart organizations that are reported from here and there.

The big idea with these new promoters appears to be about the same that is in the minds of those who make tax laws for the automotive vehicles—that the owner of an automobile must be rich, therefore he should be easy picking.

And most of them are. To a very large extent motorists are joining these new clubs because the dues are lower than those of the established clubs. The motorist apparently knows that a motor club in the abstract is a very good thing and he does not stop to inquire who is behind the one that he is joining or what hope there may be of it doing the many things that are promised.

This appears to open a field for dealers to befriend

their customers. A dealer naturally wants to sell to his customers as much merchandise as is possible. If his customers go about the country being swindled by fake automobile clubs, paying outrageous taxes and being mulcted by speed trap officers, he will have much less money to spend with his dealer and will be in a much less friendly attitude toward his motor car and what goes with it.

Dealers will be doing themselves and their customers a real service if they will become active in circulating warning against these upstart organizations. A worthwhile motor club should be easily defined. It is a public institution and must be run by worthwhile people for other than personal profit. Of course, it is necessary to pay persons who devote their time to motor club affairs, but such an organization should be chiefly a beneficiary organization.



The flat rate merely means putting the sensible practices of merchandising into maintenance sales.



Speed and the Law

A LEGISLATOR in a western state recently announced that he would try to have a law enacted establishing a minimum speed as well as a maximum speed on the boulevards and paved highways of his state. He realized that under certain conditions—on roads of average width with traffic streams flowing both ways—the loafing driver in probably as much a menace as the speeder. The loafer dams up the traffic behind him until some of those who are behind but eager to get ahead cut out beyond the middle of the road and into the opposite traffic. Sometimes they don't get out of the way in time.

This one danger might be eliminated by the building of wider roads, provided the slow driver would keep to the right, but at the present cost of constructing paved highways it is not likely that those traversing the country districts will be made much wider.

This situation, however, is related here not in support of having slow driving made punishable, but to call attention to the futility of laws which fix a maximum legal rate of speed—say 20 or 30 miles an hour—without regard to other factors of danger or safety. If such laws were rigidly enforced on all cross-country highways the incentive for touring—and consequently the prospective automobile market—would be greatly reduced, for there is rarely a driver on the open roads who does not at some time exceed 30 miles an hour. But sooner or later, when with a straight, clear stretch ahead he "steps on the gas," a fee-hungry constable scoots from the bushes where he has been lurking and gives chase. It means a fine and a fattened bank account for constable and magistrate. The development of the well-known speed-trap, which is a growing deterrent to automobile ownership, is a natural consequence of artificial limitations of speed under which the driver may be arrested and fined irrespective of any other conditions.

It is not the speedy but the reckless driver who is a menace on the boulevards and highways. There are circumstances under which a speed much less than the lawful rate would be unquestionably reckless and there are other circumstances under which a speed greatly in excess of the 20 or 30 miles an hour plainly would not be reckless or dangerous.

The Automobile Association of Great Britain has re-

cently given attention to this idea and in its annual report it is stated that its departmental committee on road regulations has collected a mass of evidence and presented it to Ministry of Transport and to Parliament. The report states:

The main and most important proposal they had made was that the speed limit should now be abolished. They had come to this conclusion after hearing the evidence of highway authorities as well as of motorists, that in the interests of the community at large it is no use keeping up the old speed regulations, because they are of no use to motorists and are no good to the general public. In other words, they had come to the conclusion that the danger is not on account of speed, but it is on account of the conditions of the traffic on the roads; that a speed higher than the ordinary 20 miles an hour may be perfectly safe on a wide, open road, and a speed of five miles an hour may be dangerous passing a school when the children are coming out. The danger was not in the speed, but in the mode and the method of driving.

The law should be such that the careful, cautious driver might enjoy a burst of speed when the conditions warrant, but it also should make it impossible for the heedless, reckless, dangerous driver ever to be upon the road. This is a matter of vital interest to every person engaged in the distribution or legitimate use of automotive vehicles. It is a traffic problem that the dealer, for his own interest, should help to solve in the right way so that his industry may not suffer.



The same smile that puts over the sale will soften the complaint.



An Automobile Dealer Lecture Course

RECENTLY the Illinois Automotive Trade Association issued a speaker's list which contained 28 names of men willing to address local associations. The topics on which these men were willing to talk were also listed. This is an interesting development and could be made a splendid service to the local association members.

Suppose a local association was to plan a systematic lecture course for the nine meeting months, select subjects which the members of the association would like to hear discussed and then definitely arrange such a program. This would insure local interest in the association meetings and the proper arrangement of the program would insure a progressive and educative course for the winter.

Such a course would be much like the university extension courses that have proven so popular and so valuable with studious persons in many of the communities that have not the advantage of large educational institutions. The value of such education is admitted and it would be doubly of value to a group of automotive men who gather to hear men successful in their own business discuss the points with which they are most familiar.

Such a course might include speakers on financing automotive sales, progressive sales policies, accounting, banking, maintenance organization, salesmen, commissions, advertising, factory co-operation and other familiar phases of the business. There is not a single dealer who could not learn something from a lecture by a man who has specialized in one of these subjects. The organization of such a course certainly is an excellent state association activity.

We see a great future for such an automotive dealer Chautauqua if the local association men will take it up.

Strikes Begin to Affect Production

Operations Slightly Slowed Up at Detroit and Cleveland

Shortage of Supplies and Parts Likely to Become Serious if Rail and Coal Walkouts Continue

NEW YORK, July 25—While the coal and rail strikes have not yet seriously interfered with automotive production their effects are becoming apparent in such centers of the industry as Detroit and Cleveland. If the walkouts continue another week they will result in a considerable slowing up of operations.

Curtaillment of steel production and reluctance of companies to accept orders has brought keener competition and the payment of larger premiums by automobile makers for immediate deliveries of much needed supplies. This shortage will rapidly become more acute.

Parts members have encountered no actual car shortage as yet but deliveries of their shipments of finished products and of raw materials to them are showing steadily lengthening delays. Freight congestion is becoming more severe at the strategic gateways and embargoes are being declared at such important centers as St. Louis.

"Driveaways" Will Help

Passenger car and truck manufacturers will be able to deliver a large part of their products by resorting to the expedient of driving their vehicles from the factories to their destinations, but their output will be seriously impeded in a very short time by difficulty in obtaining supplies. "Driveaways" from the factories are no novelty for automobile makers. The Detroit Edison Co., which supplies power to most of the plants in that city, still has on hand considerable stocks of coal.

The seasonal decline in passenger car sales has become a little more general in the past week, but has not reached serious proportions and is considerably less than normal. If serious industrial stagnation results from the strikes and the shortage of railroad rolling stock, buying power naturally will diminish and the demand for automobiles will fall off somewhat.

The market for heavy trucks is dull, but it probably will be stimulated by inability of the railroads to move the freight offered them. Farm demand for light trucks is expected to increase in a short time.

Manufacturers in the automotive field will resort so far as possible to the use of trucks to bring in their supplies and they probably will be able to avoid closing their plants provided the strikes do not cause comparatively complete suspension of iron and steel production. This would be a situation with which trucks could not cope.

OLDSMOBILE PRICES REDUCED

DETROIT, July 27—Lower prices on the Oldsmobile eight and four-cylinder lines are effective July 30, the reductions on the eight ranging from \$100 to \$150, and on the four from \$30 to \$50. Prices on the large eight and the Oldsmobile Economy truck are unchanged. Comparison of new prices and old is as follows:

	New Price	Old Price
8-cylinder		
Phaeton and roadster.....	\$1,495	\$1,595
Sport	1,725	1,825
Coupe	1,995	2,145
Sedan	2,145	2,295
4-cylinder—		
Phaeton and roadster.....	1,095	1,145
Semi-sport	1,225	1,265
California top phaeton.....	1,395	1,425
Coupe	1,595	1,645
Sedan	1,745	1,795

Details Special Mechanic For Tourists

OMAHA, Neb., July 23—All Cadillac tourists are proud of the Hansen-Cadillac service station at Omaha. Why shouldn't they be? J. H. Hansen has detailed a special mechanic to look after the needs of tourists who stop at his service station. Whenever the Cadillac tourist want adjustments, grease or oil, and his car pulls into the shop, there is a mechanic there with a snap.

INCREASES ENGINE PRODUCTION

DETROIT, July 21—Continental Motors Corp. will increase its production of passenger car engines in August by 20 per cent over the total in July. This increase, while more marked in its light six model than in others, nevertheless represents an increase in production in all passenger car models. Business in the truck field is fluctuating, the company reports.

Many of its passenger car companies are making commitments on a 90-day basis at this time, whereas the truck buyers are holding their orders to a much closer schedule owing to the uncertainties in this field. By reason of the longer commitments the company is enabled to make more prompt deliveries in the car field than in the truck.

Production of the engine for the Durant Star car is steadily mounting and will reach 1,000 daily in the near future.

JORDAN'S RECORD PRODUCTION

CLEVELAND, O., July 21—Production of the Jordan Motor Car Co. for the three months ending June 30 was 60 per cent greater than the production in the corresponding months of 1921. Factory officials state that July production will exceed that of June.

N. A. C. C. Data Show Sales Will Continue Good for Month

Denver, Peoria, Des Moines, Cleveland and Others Expect "Very Good" Time

NEW YORK, July 22.—Retail sales data gathered by the National Automobile Chamber of Commerce for the information of its directors show that prospects for July and August are better than the seasonal outlook for the mid-summer months. Cities which state that sales for the next six weeks probably will be "very good" are Denver, Peoria, Des Moines, Cleveland, Sioux Falls, New York, Seattle and Kansas City.

Reports of a slight seasonable decline were made by Indianapolis, Boston, Richmond and Fargo.

Atlanta reports that the outlook for July and August is not good and there has been a considerable decrease in Detroit.

All these cities, without exception, report that the prospects are good for closed car business in the fall.

The used car market is good in Denver, Boston, Detroit, Sioux Falls, Richmond, Seattle, Kansas City and Los Angeles. It is slowing up in Peoria, Indianapolis, Fargo and Atlanta.

The reports, generally, give little encouragement for increased truck sales for the next six months.

SALE OF PARENTI CO. PROTESTED

BUFFALO, N. Y., July 22.—About 1000 stockholders of the defunct Parenti Motor Co., Inc., living at Farrell, Sharon and New Castle, Pa., through an attorney, filed papers in the federal clerk's office here, asking that the sale of the company by the Marine Trust Co., as trustee, to the Hanover Motor Car Co. of Hanover, Pa., be declared null and void.

The out of town stockholders claim that the option given to them at the time the firm went into bankruptcy did not cover a long enough period, and it is now understood they are ready to buy the factory. The property is appraised at \$32,000. Federal Judge Hazel appointed William C. Reilley temporary receiver of the property until the decision is made.

STANDARD CO. MOVES OFFICES

PITTSBURGH, July 22.—The Standard Motor Car Co. will move its general offices from the engine manufacturing plant in this city to its main plant at Butler, Pa. The move was decided before to expedite general business and promote economies impossible with the executive, engineering, sales and service departments so far removed from the factory. The new concrete and steel assembly building in which the general offices are located is of two-story construction, 800 feet long and 200 feet wide.

June Output Totaled 288,000

Durant to Build Flint Car; Takes Locomobile Presidency

**New 6-Cylinder Automobile Will
Be Shown Sept. 15—On
Market Jan. 1**

NEW YORK, July 22—Two more spectacular moves for the expansion of Durant Motors, Inc., have been announced this week by W. C. Durant.

The first was that Durant will assume the presidency of the Locomobile Co. and control its destinies hereafter.

The second was the incorporation in Michigan of the Flint Motors Co., which will manufacture at Long Island City and in Flint a light six-cylinder car which will sell for \$1,180.

The Locomobile announcement, which came first, had been discounted. It did not include details of the financial arrangements under which Durant takes control but it paid high tribute to the character of the Locomobile and stated emphatically that this car will be continued in its present exclusive class and that it will be manufactured as originally in the factory at Bridgeport. No price change is contemplated at this time. Present owners will be assured of adequate service. Production will be governed entirely by demand.

By the incorporation of the Flint Motors Co., which will have a plant at Flint, Durant has kept the pledge he made to the city of Flint, his former home, when he organized Durant Motors, that one of its plants would be located there. The factory will be similar in size to that built at Lansing for production of the Durant 4.

The Flint car will be a refinement of the so-called Chrysler-6 which was to be manufactured in the huge Elizabeth, N. J., plant of the Willys Corp., which recently was taken over by Durant Motors. When Durant purchased this plant he acquired the rights to the Chrysler car which had been designed at a cost of approximately \$2,000,000. The car will be redesigned and made somewhat larger than the original model. It will include the seven bearing crankshaft and other special features.

The Flint will have its first showing Sept. 15 and deliveries will begin Jan. 1, 1923.

GOODRICH TIRES REDUCED

AKRON, O., July 24—Possibility of another tire price upheaval faces the tire industry following the unexpected announcement of the B. F. Goodrich Co., of a blanket 10 per cent reduction in the prices of all Goodrich cord tires, and a 15 per cent price reduction on all Goodrich fabric casings, which were made effective as of July 20.

Goodrich is the first major tire company to slash tire prices instead of introducing new lines of cheaper tires in lieu of price cuts as has been done by several of the larger and smaller tire producing corporations in the Akron district.

The Goodrich policy, according to announcement of officials, will be to cling to the well advertised, and long standing standard Goodrich tires and to adjust prices downward to compete with other companies. No revision is made by Goodrich in truck tire or tube prices.

ALLAN A. RYAN FAILS

NEW YORK, July 24—The personal failure of Allan A. Ryan has been recorded through a voluntary petition in bankruptcy filed here, with liabilities listed at \$32,435,477, and assets at \$643,533. Secured claims, held mostly by the financial institutions, amount to \$27,806,984. The principal creditors are the banks which took over the management of Ryan's affairs following the Stutz corner of 1920. The brokerage house of Allan A. Ryan & Co. and his other business interests are not affected.

Ryan has figured most prominently in the automobile industry through his financial support of Stutz, Stromberg carbureter, Bethlehem Motor and the Times Square Auto Supply Co.

Stutz Not Affected

INDIANAPOLIS, July 24—Officials of the Stutz Motor Car Co., state that the Ryan failure will have no effect whatever on the Stutz company, as Ryan has not been identified with the Stutz control since last January when he relinquished his position on the Stutz board of directors. Neither will the Ryan failure have any effect on the Frontenac Motor Company, it is said. He has not been associated with this board of directors since early in May.

ORDERS FOLLOW PRICE REDUCTION

BUFFALO, July 21—Orders resulting from the price reduction announced on July 15th by the Pierce-Arrow Motor Car Co., have put the plant upon a full-time basis.

More workers are being employed at the factory and the force will be increased day by day until the plant obtains the required number to maintain production throughout the year.

VELIE REDUCTIONS \$120

MOLINE, Ill., July 22—Velie Motors Corp. announces a price reduction on Model 58 open body types as follows:

	Old Price	New Price
2-passenger Roadster	\$1,395	\$1,275
5-passenger Phaeton	1,395	1,275

New High Figure for Cars and Trucks Made in One Month

**N. A. C. C. Estimates More Than
2,000,000 Motor Vehicles Man-
ufactured in First Six Months**

NEW YORK, July 24—Practically complete returns to the National Automobile Chamber of Commerce on production of cars and trucks for June show that the total approximated 288,000. This exceeded by 17,000 the estimate of 271,000 based on returns from companies making 90 per cent of the motor vehicles turned out. It was an increase of 12 per cent over the May record of 256,000.

The June figures, according to the N. A. C. C., indicate a production of more than 2,000,000 motor vehicles for 1922. The output for the second quarter now stands at 763,000.

SHOW MANAGERS TO MEET SEPT. 15

NEW YORK, July 24—Neal G. Adair, secretary of the Show Managers' Association, has called a meeting of that Association in Chicago for Sept. 14 and 15. All secretaries or managers of local automotive associations are invited to attend this meeting. The sessions will be devoted chiefly to discussion of used car problems and the part associations may have in formulating plans for handling this problem. Hotel arrangements and other details of this meeting will be announced later.

ANOTHER FORDSON SHOW

PHILADELPHIA, July 20.—The first Fordson industrial tractor show ever conducted in this part of the country was held for five days under the auspices of the local Ford Motor Co., the exhibitions being given in a lot at Broad street and Allegheny avenue. Thirty thousand invitations were issued. The average attendance was 2000. The show was virtually the same in principle as those given in other parts of the country. Henry Ford addressed the visitors by radio from his home in Dearborn, Mich.

TIRE PRICES INCREASED

AKRON, O., July 20—Announcement is made by the American Rubber & Tire Co. of an advance in price of its tires, effective July 10. This revision applies particularly to casings of cord construction which constitutes a large percentage of the company's output.

NO JULY SLUMP IN NEW ENGLAND

BOSTON, July 24—With but one more week in July, many of the motor dealers in Boston state that business has kept up so that it is even with, and in some cases ahead of, the June sales.

July Dealer Business in Milwaukee Up to Every Forecast

Truck Sales Increase Steadily and Dealers Expect Spurt in This Line

MILWAUKEE, Wis., July 24.—Dealer business so far in July has come up to every expectation, and while some dealers have not been able to maintain the average of May and June, others are able to report increases in sales. It had been expected generally that as usual July might show a uniform decline that might carry through August, with a rising sales curve in September, under the influence of offerings of 1923 models, the exhilaration of the annual state fair in Milwaukee upon local and state business, city and rural, and the seasonal fall buying period.

The well sustained character of passenger car trade is considered a reflection of the general acknowledgment that events of the last two months particularly confirmed the impression that business is well started on an upward trend. Heads of corporations, department managers, merchants, salaried men and small business men who have been delaying purchases to await developments and determine whether or not the rising trend of general business was of a momentary or permanent nature, are now coming into the market slowly but steadily. This source of new business is compensating for the gradual elimination of prospect lists by past sales.

Thus there has been no real exhaustion of prospects; on the contrary, while the cream has been skimmed off, new layers are forming on the top every day and there is plenty of material for salesmen to work upon. While selling is a harder proposition than it was one, two, three and four months ago, its prosecution is made more intensive as the difficulties increase, with the result that the level of business is not developing into a downward curve.

Motor truck sales are increasing steadily, and unless the railroad labor troubles are settled soon, with a consequent serious impairment of service, makers as well as dealers look for a spurt in commercial car business.

NASH EARNINGS HIGH

KENOSHA, Wis., July 21.—Earnings of the Nash Motors Co. from Dec. 1 to April 30 were \$2,173,000, as compared with \$2,226,000 for the full fiscal year of 1921. The balance sheet of the company as of April 30 showed a surplus of \$14,905,000, equivalent to \$273 a share on the 54,600 shares of common outstanding.

GOODYEAR TIRES IN FRANCE

PARIS, July 10.—Goodyear has just come on the French market with a central organization in Paris established by the Goodyear Tire & Rubber Export Co. Charles G. Jerosch, who is in charge of the French organization, has his head-

quarters in the Rue de Ponthieu, close to the Champs-Elysees.

Jerosch states that the Goodyear Export Co. has taken over these premises from a French dealer who got into business a few months ago. A French joint stock company has been formed and will take care of all France, Belgium, and some other portions of the Continent of Europe.

5,000 "Copper" Air-Cooled Cars to be Made in August

DETROIT, July 24.—General Motors Corp. has placed commitments for material for 5,000 of its "copper" air-cooled cars, shipments to begin in August. The corporation is planning to get into production on a small scale in August, the original commitment being intended for first work on the new car and will cover production over a period of several months.

The first cars in the "copper-cooled" line will be built at the Chevrolet factories in Flint, but no announcement has been made as to whether this car would bear the Chevrolet nameplates. Prices will be higher than the Chevrolet 490 line, but the car will be in the low price field and is intended primarily to meet the demand for a low-priced air-cooled vehicle.

STRIKE HURTS ILLINOIS SALES

BLOOMINGTON, Ill., July 21.—The strike of railway shop men has affected the sale of the lower and medium-priced automobiles in the central Illinois territory, according to dealers. Such reports are heard from Decatur, Springfield, Peoria, Danville, Aurora, Galesburg and other cities with large railway shops.

Sales of cars to farmers and business men show no diminution, however, and a highly satisfactory summer trade is reported in this section of the state. Crop prospects continue to be encouraging and prices are satisfactory to the men who till the soil. The railroads are somewhat backward about delivering cars and driveways may be necessary if the strike is prolonged.

NEW PIERCE-ARROW PRICES

BUFFALO, N. Y., July 25.—The complete revised price list of the Pierce-Arrow cars, all models of which were reduced last week, follows:

Model	Old	New
Runabout	\$7,000	\$5,250
4 Pas. Phaeton	6,500	5,250
7 Pas. Phaeton	6,500	5,250
Brougham	8,000	6,800
Landaulet	8,250	7,000
4 Pas. Sedan	8,250	6,900
Coupe	8,000	6,800
7 Pas. Sedan	8,500	7,000

CHICAGO SHOW JAN. 27 TO FEB. 3

NEW YORK, July 22.—The directors of the National Automobile Chamber of Commerce have decided to use the Grand Central Palace again for the 1923 show, which will be held the week of Jan. 6-13. The Chicago show will be held from Jan. 27 to Feb. 3 in the Coliseum and the First Regiment Armory as usual.

Buyers Assured of Dealer's Interest After Sale of Car

Lexington President Asks That Letter Be Sent Accepting Responsibility for Owner's Satisfaction

CONNERSVILLE, Ind., July 24.—Emphasizing the importance of service after the sale so that the owner may be completely satisfied with his car, Frank B. Anstead, president of the Lexington Motor Co., has requested that all Lexington dealers and distributors, on the day following a sale, send to the purchaser a letter stating that the company accepts full responsibility for his satisfaction and inviting him to make frequent calls at the dealer's place. The letter follows:

"Now that you have accepted delivery of your new car, we want you to know we accept complete responsibility for your satisfaction. We are grateful for your patronage.

"You know it is a good motor car, worthy of your confidence and ours. The manufacturer guarantees it mechanically perfect. We shall fulfill that guarantee in every sense.

"It is our desire to at all times see that your new Lexington performs as it should.

"You have your personal preference about some details of its performance, perhaps, and we are here to see that the car makes you glad you own it every time you turn your ignition switch key.

"Communicate with us often. Our telephone service is good. And we are more interested in you now than when you were in the market for a Lexington.

"The pride of this organization always has been, and always will be, that its oldest customers are its best friends."

GENERAL MOTORS PROFITS LARGE

NEW YORK, July 21.—Preliminary estimate of the income account of the General Motors Corp. for the first six months of 1922 shows net earnings of \$26,839,391 on the common stock. Net sales for the half year aggregated \$218,490,887, of which \$137,800,000 were in the second quarter. Net earnings, before Federal taxes and interest charges, were \$35,116,481 with \$25,970,000 in the second quarter. Net earnings, after all charges, for the six months were \$29,997,391. Dividends on the preferred and debenture stock for the six months required \$3,158,000.

In the six months ending June 30, approximately \$6,200,000 net has been added to reserves for depreciation and the balance in these reserves now stands at \$43,700,000.

All bank loans were paid off by June 30, and, except for approximately \$5,400,000 of purchase money obligations, General Motors Corp. has no indebtedness underlying its preferred and debenture stock, except ordinary current accounts payable for merchandise. Cash in bank as of June 30 was approximately \$35,000,000.

Associated Motor Industries Working on Plan of Operation

Will I. Ohmer, Chairman, Tells Motor Age Plan Will Include Other Companies

CHICAGO, July 20—Further details of the plan of operation of the Associated Motor Industries, the merger of nine automobile and parts manufacturers which was announced two weeks ago, are being worked out in meetings of the board of directors here this week. The board has confirmed many of the actions taken by the organizers and has authorized the officers to qualify the company to do business in the various states.

In an interview for *MOTOR AGE*, Will I. Ohmer, chairman of the board, stated that although it is the purpose of the corporation to take in a number of other manufacturing units, no definite steps toward that end have as yet been taken.

"Additional manufacturing plants will be bought only when needed," he said. "We do not want a lot of idle space and we are not going to take in additional plants until we are ready for them."

Among other things which he discussed were the future production plans and the financing plans of Associated Motors. He said he proposes to visit each of the plants beginning next week, together with other officials, and make a survey of the possibilities of each factory and as soon as possible get each one into capacity production.

"I am confident," he said, "that most of the plants can produce twice as much as they have ever produced in the past. They will all be reorganized along the most economical lines. The whole business will be directed from the central office at Dayton. The Associated Motors owns outright all the other plants and there will not be any other boards of directors or officers except those of the Associated Motors. We will need at each plant an executive manager and a factory manager."

He said tentative plans call for the manufacture of all electrical and ignition equipment at the Dayton plant, sheet metal, fenders and the like at the Saginaw plant and transmissions and gears at the Lockport, N. Y., plant. Further specialization of parts production probably will be worked out.

Discussing the financing plans, Ohmer said practically all the securities that would be issued had already been subscribed for. The securities include a \$6,000,000 bond issue which he said has been largely subscribed for by banks holding bonds of the member companies for the retirement of which the Associated Motors bonds are issued. There will be no general offering of stocks or bonds to the public, he said.

He made it plain that the sales policy for all the products of the company will be formulated and directed from the central office at Dayton. A plan to finance retail sales has been worked out and is

to be operated by R. A. Crandall & Co., a separate corporation in which the Associated Motors will hold a substantial interest. Details of this plan will be announced soon.

An engineering and designing department will be maintained at Dayton. It is planned to continue manufacturing the National, Jackson and Dixie Flyer cars and no plans have been made for new models, Ohmer said.

Tire Production Near Peak; Year's Output, 35,000,000

AKRON, Ohio, July 21—With one or two minor exceptions the rubber industry continues at the production peak reached late in July. It is reported semi-officially that production has been decreased slightly at the Goodyear Tire & Rubber Co. during the past two weeks, but production has been higher at Goodyear than was indicated by the official statements and for this reason more than 26,000 tires continue to be made a day at this factory.

The other factories, while not actually making any decreases, have practically ceased making increases, indicating that the crest of the season's sales has passed and that the next move will be downward, due primarily to the reduced buying of tires for original equipment on the part of the automobile manufacturers.

The dealers' sales will probably continue through this and the coming month, according to leading authorities, which means that those factories depending upon the consumer trade will not be compelled to slacken production speed during the next two months at least.

Tire production thus far this year has been greater in units than at any previous time in the history of the industry, and it is now estimated that the industry will produce at least 33,000,000 tires in America this year as compared with a previous peak production of 32,400,000.

MIDWEST ENGINE ASSETS SOLD

INDIANAPOLIS, July 21—Assets of the Midwest Engine Co. have been sold for \$312,500 to the reorganization committee, which assumes mortgages aggregating \$1,750,000.

Marked improvement in the business of the company was reported to the court by the committee and announcement was made that new contracts aggregating several hundred thousand dollars would be assigned after the confirmation of the sale.

TO SERVICE ALLEN CARS

PHILADELPHIA, July 22.—At the recent receiver's sale of the assets of the Allen Motor Car Co., held in Columbus, O., the Levene Motor Co., of this city, purchased most of the lots containing service parts and repairs. The company announces that the material is to be moved to Philadelphia and that hereafter it will be in a position to provide service for all Allen cars in the hands of owners.

Hupp Motor Corp. Starts Big Factory Expansion at Detroit

Work Now Under Way Is Part of Plan Adopted Three Years Ago

DETROIT, July 24—In accordance with a building program adopted three years ago, the Hupp Motor Car Corp. is now adding new construction to its big plant on East Milwaukee ave. in Detroit which will increase the factory floor space by more than 500,000 square feet.

Completion of the new buildings in process of erection will give the Hupmobile main plant a total floor space of not less than 1,570,000 square feet with as modern equipment and building design, it is said, as can be found in the industry.

In addition to the main plant in Detroit there are five subsidiary Hupmobile manufacturing properties, four of which are owned by the Hupp Motor Car Corporation and the fifth controlled by it, all of the products of which are devoted to Hupmobile production. These are: A factory for gear and machine work in Jackson, Mich.; a large body building plant in Racine, Wis.; a Windsor, Ont., plant for Canadian shipping purposes; the Detroit Auto Specialties Co., a stamping concern; and the Auto Metal Body Co., a closed body factory in Springfield, Mass.

The five subsidiary plants just mentioned have a combined floor space of approximately 1,180,000 square feet, which, added to the main plant, gives Hupmobile manufacturing facilities in floor space alone of at least 2,750,000 square feet.

APPOINTS 17 HAYNES DEALERS

MILWAUKEE, Wis., July 22—The Triangle Motors, Inc., 539 Milwaukee street, Milwaukee, state distributor of the Haynes, has made the following dealer appointments:

Milwaukee, Ben Luedke & Co., 717 Scott street; Oshkosh, Wis., Fred J. Smith; Waukesha, Wis., Harry's Garage; Antigo, Wis., Dorsziski & Kielcheski; Wisconsin Rapids, Wis., George B. Huntington; Rhinelander, Wis., McKenzie & Meyer; Madison, Wis., Jones Auto Co.; Fond du Lac, Wis., Eugene Raymer Auto Co.; Burlington, Wis., Kramer & Marquardt; Oconto, Wis., Bradley Auto Co.; Appleton, Wis., M. & M. Motor Co.; Stevens Point, Wis., P. F. Koshollek; Beloit, Wis., J. F. McKearn; Gladstone, Mich., Snyder Auto Co.; Houghton, Mich., E. R. Bassett; Munising, Mich., Munising Motor Co.; Ontonagon, Mich., Alexander & Boyd.

STARTS FORD TIRE PRODUCTION

AKRON, O., July 24—Mason Tire and Rubber Co. has started production of Ford size cord tires in the Owen Tire and Rubber Co. plant which was purchased at receiver's sale several weeks ago and new orders which are received by company will make possible the increasing of production to the 2,000 goal set when the plant was purchased, according to official announcement.

N. A. D. A. Tells What It Has Accomplished for Members

"One of a Thousand" Merchants Have Detective Agency Protection and Other Helps

ST. LOUIS, Mo., July 24.—The National Automobile Dealers' Association has issued a bulletin reciting its activities in behalf of members during the first four months of its existence, under the "One of a Thousand" plan.

Following is the announcement of the association:

"BUSINESS STANDARDS"—For the first time in the history of the automobile industry the leaders have taken a definite, united and organized stand on the ethical issues involved in the successful conduct of the motor vehicle business.

"INSURANCE"—Saved from 20 to 40 per cent on the insurance payments of the "One of a Thousand" merchants effecting an estimated saving of a half million dollars on policies written by the association's insurance carriers and on reductions in premium of policies written by carrier in an effort to hold coverage in competition with N. A. D. A. rates. Provided a uniform fire, theft and transportation policy and a uniform workman's compensation, (employers' liability), public liability and property damage policy and a standard of insurance service of the highest type.

"DETECTIVE BUREAU"—Through the association's contract with the William J. Burns International Detective Agency, virtually the same protective service has been provided for the "One of a Thousand" members as is given to the 26,000 banks of the U. S., members of the American Bankers' Association. Recoveries have been made for dealers in numerous parts of the country, consisting of collections of protested checks, "won't pay" accounts and stolen vehicles. Sums range from \$30 up to \$3,000 recovered by this means.

"INFORMATION"—Publication and dissemination of membership bulletins containing numerous subjects of business information and service, surpassing, in the opinion of numerous members, anything similar published by any source outside the dealer industry.

"TAXATION"—In constant conference with the U. S. Bureau of Internal Revenue over details of taxation and assessment involving automobile dealers and the interpretation of automobile excises. The membership is kept constantly advised of bureau rulings affecting returns. The association also has made numerous appearances at hearings designed to increase the tax burden of the industry.

"ORGANIZATION HELP"—Established a Service Bureau for automotive trade organization secretaries for extending the work of the N. A. D. A. down through the state and local bodies of automotive merchants so that ultimately the high standards of the N. A. D. A. will be ac-

cepted as the general practices of the whole trade. This bureau proposes to develop and aid the state and local association secretaries to develop genuine constructive service organizations in each state so that state and local legislative, taxing, traffic problems and the like can be handled with the same clarity as national problems are handled by representative dealers through committee in the N. A. D. A.

"EXPOSING FAKES"—Exposed a fake motion picture promotion which was preying off automobile dealers.

"Demanded and received from a nationally advertising manufacturer co-operation in the writing of copy for that concern's advertising that would not cast reflections upon the motor vehicle industry. We regarded copy as thoughtlessly injurious to our industry."

"GASOLINE INQUIRY"—Began agitation which has brought on present Senatorial investigation into the price of gasoline; laid information on price conditions before Federal Trade Commission and Senators LaFollette of Wisconsin and McKellar of Tennessee urging Congressional action to protect motorists against arbitrary increases in cost of motor fuel. Association will continue this activity until gasoline prices are made on logical basis or until facts have been shown to motoring public that power lies in their hands to remedy the situation by backing our stand up in Congress.

"There are numerous other features involving individual dealers or minor groups of dealers but these are the high points of our activities affecting the industry."

\$750,000,000 FOR HIGHWAYS

WASHINGTON, July 24.—Compilations of moneys now available, made by the bureau of public roads, Department of Agriculture, for automotive highway construction, show that there is approximately \$750,000,000, which includes the federal as well as local funds.

Reports made by each of the 48 states show that California leads in the amounts to be spent the current year for good roads with \$53,000,000. Pennsylvania has \$52,000,000; Illinois, \$47,500,000; New York, \$47,000,000, and Texas, \$43,000,000.

A. E. A. MEMBERSHIP PASSES 500

CHICAGO, July 21.—It is announced at the offices of the Automotive Equipment Association here that for the first time the membership of that organization exceeds 500. The membership has hovered about the 500 mark for several years, always just below that number. A recount of the happenings at the Colorado Springs meeting shows that the number has reached 507. Of these members, 240 are jobbers and 267 are manufacturers.

KNOX RUBBER CO. SOLD

MT. VERNON, Ohio, July 22.—Sale of the Knox Tire & Rubber Co. to stockholders has been approved by Federal Judge Sater. The purchase money has been paid in full and all objections to the confirmation were overruled.

Department of Justice Makes Report on Dyer Anti-Theft Law

Number of Recoveries, Persons Prosecuted, Convicted and Fined All Listed by Investigators

WASHINGTON, July 24.—Since the passage of the Dyer Anti-Theft Automobile Law in October, 1919, 2,120 automobiles, worth, at a fair second-hand valuation, \$2,567,208, have been recovered by the bureau of investigation, U. S. Department of Justice, according to figures compiled by that bureau at the request of officials of the American Automobile Assn. The department, according to these figures, has investigated 2,391 cases which involved 4,385 persons. There were 2,773 persons arrested of whom 1,533 were indicted and 1,113 convicted. These convicted persons received sentences amounting in the aggregate to 2,356 years, 6 months, 11 days and paid fines to the amount of \$41,140. The American Automobile Assn. took an active part in supporting the Dyer Anti-Theft Bill which was prepared by Representative L. C. Dyer of Missouri who is an active member of the Automobile Club of Missouri and who was assisted in obtaining facts necessary for the preparation of this measure by the Automobile Club of Missouri and the A. A. A.

The outstanding feature of the Dyer Law is the fact that it places interstate transportation of stolen motor vehicles under Federal law and makes such an action punishable in Federal courts. Before the passage of this act there had been built up a great and growing traffic in stolen motor vehicles, conducted by bands of unscrupulous men who maintained assembling factories at various points and who, through their ability to transpose parts of various machines, one to the other, were able to so alter a stolen car as to make it practically unrecognizable to the original owner. State laws were inadequate to reach these men and the Dyer Bill filled a long felt want.

At the present time officials of the A. A. A. are working in conjunction with Federal officials and heads of other organizations in an endeavor to induce motor car manufacturers to permanently mark all automobiles so as to make identification more easy. It is hoped that results along this line will be obtained in the near future.

CAMP SITES IN MASSACHUSETTS

BOSTON, July 22.—Gov. Channing H. Cox of Massachusetts, who is a keen motorist, has sent a communication to John N. Cole, chairman of the department of public works, and Commissioner William A. L. Bazeley of the conservation resources department, calling their attention to the fact that the growing custom of automobile camping parties and residents in general to find outdoor homes in Summer should be recognized by arranging for suitable camping sites. This is equivalent to starting the movement at once.

Here in Four Reels Are Makers of—



(Continued on next page)

Insurance Bureau to Conduct Automobile Safety Campaign

NEW YORK, July 24—The National Bureau of Casualty and Surety Underwriters, of which Jesse Philips, former state superintendent of insurance is general manager, has decided to conduct for its members an automobile accident prevention campaign and has appropriated a substantial sum for this purpose. The bureau makes the rates for automobile insurance, other than fire and theft, and its membership includes 23 of the leading stock casualty companies.

The campaign was decided upon for business reasons. Statistics for the year 1921 show that there were 12,500 deaths from automobiles in that year and more than 300,000 other accidents. The efforts of the bureau will be directed along fundamental lines such as expert studies looking toward better control of traffic conditions, development of safety education in public schools and among drivers and stimulation of intelligent treatment of the subject by local authorities.

TO MAKE ANTI-KNOCK LIQUID

NEW YORK, July 26—Commercial production by the General Motors Research Corp. of tetra ethyl lead, the anti-knock liquid which has been developed in its laboratories, probably will not be started for several months. It first will be necessary to provide a plant which probably will be located where there is an abundance of water power. The liquid is produced by a process of distillation and it is highly explosive, which will make it necessary to locate the plant with care.

When commercial production is begun, the liquid will be supplied first to the government for use in aircraft. The

second customer to be taken care of probably will be the Fifth Avenue Coach Co. and the third, a Chicago taxicab company which operates a large fleet of cabs.

4305 PACKARDS SOLD IN 3 MONTHS

DETROIT, July 26—Sales of the Packard Motor Car Co. for the third quarter of its fiscal year ending May 31, totalled 4,305 vehicles and amounted to \$11,226,958. Net profits from operation for the quarter were \$317,959. Factory inventories were reduced from \$9,527,575 to \$6,144,289 and inventories at factory branches from \$7,250,487 to \$5,117,014. The company's holdings of cash and bonds amounted to over \$15,800,000, an increase of \$5,000,000 in the quarter.

TRACTOR SHOW AT NEW ORLEANS

NEW ORLEANS, July 21—The eight Ford and Fordson dealers in New Orleans and nearly 50 manufacturers of industrial equipment will hold an industrial tractor show in New Orleans, Aug. 9, 10 and 11 at which practically every use of the Fordson tractor will be demonstrated. The dealers are the New Orleans Motor Co., Menefee Motor Co., Jarreau Motor Co., Roberts Motor Co., Bush Motor Co., J. D. Cathey, Inc., Universal Motor Co., and Edwards Motor Co. The show is under the auspices of the Ford Motor Company. Invitations are being mailed to managers, superintendents and foremen of industrial and agricultural enterprises.

M. A. M. A. MEETING SEPT. 13

NEW YORK, July 22—The annual fall convention of the Motor and Accessory Manufacturers' Association at which credit and other conditions will be discussed will be held at the Lafayette Hotel, Buffalo, Sept. 13, 14 and 15.

This Year to Be Best In History of Hudson Co.

DETROIT, July 25—Comparing business for the first six months of this year with 1920, the former leading production year, Hudson Motor Car Co. declares that sales for the six months period have been 95 per cent of total sales in the corresponding period in 1920. Before Sept. 1, production is expected to pass production for the first eight months of that year, and output for the remainder of this year will run far ahead of the latter part of the former record holder.

July sales will be about 18 per cent greater than in July, 1920. August output will be more than 50 per cent higher than in August, 1920, and more than 200 per cent greater than in 1921. June sales were the largest for any single month in the company's history.

Indications that the farmer will soon come into the market are found by the company in the fact that heavy orders are coming in from distributors in the farm belts. This is particularly true at southern points. Dealers on the eastern coast and the Pacific northwest down to San Francisco and east to Salt Lake City are also reported placing unusually large shipments.

30 OAKLAND COUPES A DAY

PONTIAC, Mich., July 24—The new two-passenger coupe put out recently by the Oakland has been put into production which will have reached 30 a day by next week, according to C. J. Nephler, sales manager. The model has not yet been furnished to all the branches, but the response in those fields where it has been shown has been such as to warrant expectation of a heavy demand.

"Ask 'Em to Buy" and "Shop Profits"



(Continued on next page)

Columbia Has Orders For 23,700 Cars, President Says

DETROIT, July 21—At the annual meeting of the Columbia Motor Car Co. stockholders President J. B. Bayerline in his report stated that Columbia had orders, from the present date until January 1, 1923, for 23,700 Light Sixes exclusive of the cars now on hand. Columbia has 9400 shipping specifications at present, Bayerline went on to say, over 5000 of which were ready for immediate delivery, making a total of \$25,000,000 worth of merchandise at the list price figures.

Columbia has 102 direct distributors in the United States and Canada, exclusive of foreign connections, and 1,015 sub-dealers, said Bayerline. He also stated that owing to the volume of orders now on hand there would be no more new dealers taken on for 30 days.

SALES INCREASE IN VANCOUVER

VANCOUVER, B. C., July 24—Taxes or no taxes, Vancouver people are buying new motor cars. In May over 300 new cars were sold in Vancouver. June sales were greater than May sales, dealers believe.

Despite increased taxation, sales of cars in the first three weeks of June were 164, according to the motor license department at the provincial court house. It is estimated that 225 cars were sold last month in Greater Vancouver, prices of which range from \$695 to \$4500.

JULY AHEAD OF JUNE

PORTLAND, Ore., July 26—July will easily surpass any previous month of this year in new car sales and registrations here, according to the automobile dealers. It is expected, in fact, that the month will be a record breaker for the Portland district over all past years,

exceeding even the heavy business of the summer of 1920.

June was an excellent month for the dealers, particularly those firms handling the standard makes of cars. Several firms reported a greater volume of business than ever before in their history, exceeding even 1920, and with prospects for July to surpass June by a considerable margin. For the dealers handling the little known lines but little improvement has manifested itself during the last several months, but the dealers in the established lines are reporting splendid business.

TRACTOR DEMONSTRATION

HOUSTON, Tex., July 21—A tractor demonstration on a large scale will be given by the Fordson people here the latter part of the month. Forty-seven tractors will be used in the demonstration which will show the various uses a tractor may be put to. Farm implements of all kinds where power is used will take part in the demonstration. The show is well advertised. It will last for three days and it is expected a large number of farmers and others interested in tractors will be here for the demonstration work.

BUSES SUPPLEMENT STREET CARS

AKRON, O., July 26—The Northern Ohio Traction and Light Co. has received the first of 11 new buses which will be added to the three already in operation as auxiliaries to the street car line. The company inaugurated the policy of supplementing street car service with buses several months ago and is now hauling approximately 4,000 passengers a day. Increased private bus and "jitney" competition also made the bus innovation necessary. The entire system is expected to be completed within the next two months.

Templar Improvement Due to President M. F. Bramley

CLEVELAND, July 24—Through the efforts of M. F. Bramley, the president and general manager, there has been a sharp improvement in the affairs of the Templar Motors Co. The committee of creditors which took charge of its affairs some time ago has been disbanded and the plan of the Templar syndicate has been declared effective. Under this plan the creditors have agreed to accept 66 2/3% of their claims in full settlement of all the company's obligations.

DEALER'S HIGH RECORD

SALT LAKE CITY, Utah, July 26—The Covey-Ballard Motor Co. of lower State street, sold 97 Fords and three Lincolns last month, breaking its own record, established in May. The company was organized three months ago and is to erect a new \$200,000 building soon. The 100 cars sold last month do not include 34 used cars, sold and delivered during the same period.

INCREASES SPEEDING PENALTY

Columbus, O., June 26.—A complete revision of the traffic laws and rules of Columbus is contained in an ordinance approved by the safety department and a special council committee. The ordinance approved by the safety department and a special council committee. The ordinance provides for a maximum penalty of six months imprisonment and \$200 fine for speeding and reckless driving.

CARS FOR TRAFFIC COPS

SALT LAKE CITY, Utah, July 21—The Commissioners of Davis county, this state, have decided to replace the motorcycles used by traffic officers with automobiles.

Movies and Their Wives Facing—



(Continued on next page)

CONCERNING MEN YOU KNOW

Stanton Latham, formerly in charge of Eastern Connecticut territory for the Wetmore-Savage Co., has been made salesmanager of the automotive division of the company's Springfield (Mass.) branch.

L. E. Watson, recently manager of the Gramm-Bernstein Motor Truck Co. of Philadelphia, has become associated with the White Co., 112 North Broad street.

Harry U. Sharp, formerly salesmanager for the Fanning-Hatch Co., Philadelphia, has been appointed salesmanager of the Lexington Motor Co. of Pennsylvania.

Michael F. Stapleton is back in the Marlin-Rockwell family again. Stapleton has severed his recent connection with the Motor Wheel Corporation, Lansing, Mich., to become western sales representative for the Standard Steel and Bearings, Inc., Philadelphia, Pa., Bearings Division, Marlin-Rockwell Corp. His territory will be practically the same as with the Motor Wheel Corp., centering around Chicago and Indianapolis. Stapleton will be remembered for his long association with the Mayo radiator division of the Marlin-Rockwell Corp.

Henry Stryker, head of Stryker & Yoemans Co., Mitchell, Oakland, Chandler and Stewart dealer in the Kingston, N. Y., territory, is dead. Stryker was president of The Automotive Dealers of Kingston, which is affiliated with the Chamber of Commerce. The Kingston dealers attended his funeral in a body.

Eugene Dautell has become manager of the Toledo Cadillac Co., to succeed Ralph A. Parker, who goes to Atlanta for the Cadillac. T. H. Towell, Cleveland, who controls the Toledo branch, announces that the business in Toledo will be considerably expanded.

E. R. Wiggins, Moline, Ill., has been appointed chief of the sales engineering department for the Holt Tractor Mfg. Co., East Peoria, Ill. He will investigate Holt tractors in the field and will submit a report upon their condition and performance. For many years, he was connected with the Deere Plow Co. of Moline and became a contributor upon technical subjects in relation to power farming to many periodicals. Since 1918 he has been connected with the Chilton publications of Philadelphia. He resigned, effective July 15, to take up his new duties the following day.

W. E. Cobb has resigned as New York branch manager of Master Trucks, Inc., Chicago, being succeeded by T. B. W. Zumstein, formerly vice president and salesmanager of the Gary Motor Truck Co.

W. H. Flemming has been placed in charge of the production service division of the Goodyear Tire and Rubber Co., Akron, O., during the temporary absence of H. T. Gillen, head of the department, who is one of nine candidates for

the republican nomination for sheriff in Summit county.

Russell Y. Cooke has resigned as salesmanager of the Racine Rubber Co., to become a Racine tire distributor in Chicago as president of the Racine Tire & Rubber Co., of Chicago. L. M. Van Riper succeeds Cooke as Racine salesmanager.

Arthur E. Barker, vice president in charge of sales of the Maxwell Motors Corp. and Chalmers Motor Corp., sailed last week for Europe on a six weeks' vacation trip, on which he is accompanied by Mrs. Barker.

David J. Willoughby, salesmanager of the Columbia Motor Co., and Norman I. Taylor, salesmanager for the Albee Corp., advertising counsel for the company, are on a business trip through the middle west on which they will hold dealer and distributor meetings in eleven cities.

Fred B. Clark, of Los Angeles, has been appointed Pacific Coast representative of the George W. Davis Motor Car Co., of Richmond, Ind., manufacturers of the Davis Six.

J. E. Carter, well known in the Chicago automotive industry, has been appointed general manager of the Roamer Motor Car Co., of Illinois. He succeeds Robert H. Lanzing.

Clarence E. Triphagen, for the past three years manager of the Detroit branch of the Reo Motor Car Co., has been called to the factory to become identified with the national sales division under R. C. Rueschaw, salesmanager. Triphagen had been connected with the factory sales force formerly and before going to Detroit was manager of the Lansing factory branch.

Chester S. Ricker, of Indianapolis, has been appointed general manager of the Duesenberg Automobile & Motors Co., in charge of operation of the plant. This relieves L. M. Rankin, vice-president, of all duties in connection with production so that he may devote his attention to distribution of cars and executive affairs of the company.

Percy Ford, racing driver, is back on the Chicago automobile row as a salesman for the Marmon Chicago Co., of which C. E. Gambill is president.

ENCLOSED CAR SALON

WASHINGTON, July 17—The Washington Automotive Trade Association will hold its annual Enclosed Car Salon, Oct. 21 to 28, on both floors of the Convention Hall.

CANADIAN SHOW SOON

TORONTO, July 15—The Officials of the Canadian National Exhibition announce that space will be allotted this week for Canada's only national automobile show (held in conjunction with the Canadian National Exhibition August 26th—September 1st). Last year a million and a quarter people attended the C. N. E. of which officials state three quarters of a million took in the motor show. At one time more than 13,000 cars were parked at the grounds, bearing license plates of every province in the Dominion and practically every state in the union. The West Wing of the New Exhibition Colliseum or Arena will be given over to Motor Truck and automotive equipment exhibits.

AVIATION MEET POSTPONED

CHICAGO, July 24—The aviation meet, air craft exhibition and aeronautical congress which was to have been held here Aug. 4 to 13 has been postponed until a time to be announced later, according to an announcement made by Charles S. Riegan, president of the Chicago Aeronautical Bureau.

"SHOP PROFITS" MEETING

WASHINGTON, Ill., July 24—The Washington Automobile Supply Co. is one of the first members of the Automotive Equipment Association to take up the "Shop Profits" campaign. It will hold a meeting July 28 at Peoria to which 550 dealers and their employees have been invited.

SHOW AT DECATUR, ILL.

DECATUR, Ill., July 17—Business men and manufacturers of Decatur, have determined to give an Industrial Exposition and Automobile Show commencing Aug. 30 and concluding Sept. 9.

the Camera at Colorado Springs



BUSINESS NOTES

Barton Mfg. Co., has been organized with \$60,000 capital at Barton, Wis., to manufacture automotive parts and equipment of all descriptions. It is understood the new concern will take over the plant of the defunct Barton Axle Co. The principals are William J. Goebel, Emil C. Backus and S. J. Driessel, all of Barton.

Bukolt Mfg. Co., of Stevens Point, Wis., manufacturer of steel-shod devices marketed as the Highway Tire Protector, has entered into a contract with the Atlantic Coast Auto Exchange, Baltimore, for exclusive selling rights along the entire Atlantic Coast, and including some of the Gulf states. The contract is estimated to be worth \$100,000 a year to the Bukolt company, which is starting additions and will install more machinery to bring up its production. The Highway Tire Protector has recently been improved by John J. Bukolt, inventor and head of the Stevens Point company, and by the use of cord instead of fabric in the sections is able to raise its guarantee from 5,000 miles to 7,000. An output of 1,000 protectors daily is planned by August 1.

Burr Reilly Co., Milwaukee, Wis. distributor of Oildag and Gredag, has moved its offices, store and warehouse to new and more commodious quarters at 522 East Water street.

Christy-Hudson Co. and Mulvaney-Johnson will occupy the fireproof garage and salesrooms, 82x150 feet, now being constructed on West Main street, Galesburg, Ill., by A. Rinella. Occupancy will be given October 1. Mulvaney-Johnson have been in business 14 years.

James C. Soenksen Co. has opened a garage and sales agency at Aurora, Ill. Capital stock has been fixed at \$20,000. The promoters are James C. Soenksen, Ray Drew and Charles R. Crounse. The company will deal in motor vehicles of all kinds, handle a complete line of accessories and also do a general service and storage business.

A. B. Wagner, Meridan, Miss., capitalist and automobile dealer, has closed a deal for the purchase from William Gilmore of the recently constructed one-story brick building on Sixth street in the center of the business district, in which the newly organized Meridian Auto and Machinery Co. will be located.

Motor Wheel Corp., Columbus, Miss., automobile spoke manufacturer, has closed a deal for a building here, where it will engage in the manufacture of spokes on a large scale as soon as the machinery can be installed. The plant is expected to be in operation by Sept. 1, and will employ about fifty people, it is stated.

L. Niemchek Mfg. Co., Milwaukee, Wis., is a new \$25,000 corporation formed by L. Niemchek, S. Grzechowiak and E. Wiszniewicz to manufacture metal stampings, tools, machinery, automotive parts, etc.

Bear Tractors, Inc., New York, manufacturers of the Bear tractors, have added three new men to their field sales force. They are Clarence Stantial, W. A. Ingalls and I. G. Melrose. Stantial will represent the Bear company in the east. Ingalls will cover northwestern territory. Melrose resigned as president of the Kirkwood Automobile Co., at Kirkwood, Mo., to accept his present position. His headquarters will be at St. Louis from which he will work in the southwestern territory.

Waukesha (Wis.) Foundry Co., manufacturer of brass castings, is planning to start work immediately on the erection of additions to increase at least 100 per cent of the shop built a little over two years. The plant has been in continuous operation since that time and is now badly handicapped in filling orders by lack of production space and facilities. Originally it served largely the manufacturing plants in Waukesha, but the trade territory has expanded to embrace Milwaukee, Chicago, Detroit, Cleveland and Indianapolis.

Glenn E. Holmes Co., Ford dealer in Chicago for a number of years, located in the loop at 30-34 East Lake street, has just been incorporated for \$100,000 by Glenn E. Holmes, Mary L. Holmes and Louise Holmes.

Auto Parts Co. has been organized at Decatur, Ill., and will deal in accessories and supplies for motor vehicles at a new building, 1063 North Water street. P. W. Gebhart, Adam Gebhart, and K. Lanterman, compose the company, the latter as manager.

Offices, sales showroom and garage of the Clinton, Iowa, Oakland Sales Co., have been transferred from 813 Fourth street to 124 Sixth avenue.

John Lindegard, associated with Everett Allen in the Maple City Motor Co., Monmouth, Ill., has disposed of his interests to his partner, who now becomes sole owner.

Elgin Auto Supply Co., has been organized at Elgin, Ill., with capital stock of \$15,000, and will open a plant at 104 Grove avenue. The company will handle motor vehicle accessories and supplies and do a general service business. The incorporators include Michael McNamara, D. M. Brewbaker, C. W. Reed, and W. F. Lynch.

Work has commenced upon a modern factory plant at Danville, Ill., to shelter the Witwer Battery Co., formerly known as the O. K. Giant Battery Corp., of East Chicago, Ind. Capitalization has been fixed at \$500,000. Of this sum, \$50,000 will be invested in buildings for machinery and offices. A tract of land has been purchased on the south end of St. Louis avenue. President H. T. Witwer announces that 100 men will be employed at the outset and this number will be doubled within a year. The East Chi-

cago plant will be closed as soon as that in Danville is in operation estimated at Oct. 1.

Portland has been designated as northwest headquarters for the Moreland Motor Truck Co. of Los Angeles, and during the past week a northwest factory branch to handle wholesale business for the entire Pacific Northwest was established here. C. H. Smith, one of the pioneer Moreland officials, will be in charge of the Portland branch as northwest manager. Simultaneously with the location of the branch here a local company to be known as the Moreland Motor Truck Co. of Oregon was formed to handle the retail in this territory.

Falor Manufacturing Co., Akron, O., which was organized a year ago by Aaron Falor, formerly with the Goodyear Tire and Rubber Co., for the manufacturing of inner tubes is making preparations to move into the former B. and W. Rubber Co. plant at Betts Corners, the new industrial suburb of Akron.

Construction of a plant for the Columbia Tire Corp., Portland, Ore., is now well under way, and the company expects to be in production in the fall, it has been announced. R. A. Wrzburg is president of the company. The plant itself will cost over \$50,000 and the machinery nearly \$125,000 more, it is stated. The company will manufacture cord tires exclusively, marketing them under the trade name of Columbia tire.

Mayson Automotive Equipment Corp., 5609 Harper avenue, Chicago, is listed as a \$10,000 corporation to deal in and manufacture automotive parts and accessories.

Campbell-Ewald Co., are now located in the General Motors Building, Detroit, occupying a suite of offices on the thirteenth floor adjoining the advisory staff offices of the General Motors Corp. Brooks, Smith & French, Inc., are now located in new offices at John R and Eliot streets, where they have taken over a former residence property.

Wills Sainte Claire Co., of Illinois, has moved to new and larger quarters at 2330 Michigan avenue, Chicago. This company recently concluded a sales contest with the New York Wills Sainte Claire distributor, winning by a margin of five cars.

Broadway Motor Service Co., 5145 Broadway, Chicago, has taken the Chicago agency for the Itala car. M. De Tullio is manager of the company.

The monthly meetings of the Chicago Automobile Trade Assn. this summer are being held at golf clubs. The first one was at the Ridgemoor club with Thomas J. Hay, president of the association, as host. The business meeting was held during luncheon, following which golf was played until dinner time.

Brant & Hurst, 11 West Lake street, Oak Park, Ill., have been appointed Wills Sainte Claire dealers in that territory.

The sales of the assets of the American Spark Plug & Porcelain Co., of Sun Prairie, Wis., for \$13,000 at receiver's sale to officers and stockholders has been confirmed by the court.

Receiver Asked for Maryland Motor Co. by Creditors

Charges of Mismanagement Are Made in \$1,000,000 Firm's Alleged Solvency

WASHINGTON, July 22—Receivership for the Maryland Motor Co., Charles H. Kehne, president, of Frederick, Md., a \$1,000,000 corporation, has been asked by the company's creditors and stockholders who allege that the company has been mismanaged and as a consequence is insolvent.

Capital stock of the company was originally \$250,000, par value of \$50 per share. After selling a large number of shares of stock, Kehne is alleged to have incorporated the company for \$1,000,000 under the laws of Delaware and to have paid unearned dividends aggregating \$20,000 to effect the sale of stock. In addition to an investigation of the affairs of the company, the court has been asked to set aside alleged fictitious transfers of stock.

Plans of the company contemplated the manufacture and sale of a "medium priced" passenger car. None, however, were ever manufactured.

Nothing Known of "Bureau" Which Issued Tractor "Survey"

CHICAGO, July 20.—A purported survey of the farm tractor industry of the United States, sent out from Minneapolis and St. Paul over the signature of the "Farm Implement Research Bureau," whose identity and place of business were not made known, has aroused considerable interest in tractor and farm implement circles here.

At the headquarters of the recognized national organization of the industry, including the National Association of Farm Implement Manufacturers and the National Institute of Progressive Farming, it was said that nothing was known of such an organization as the "Farm Implement Research Bureau."

The purported survey, which painted a dark future for most of the tractor manufacturers, was mailed in plain envelopes on which there was no printing or writing other than the address to which it was sent. The survey was in typewritten form with typewritten signature. A notice at the end stated that similar survey would be issued later on other agricultural subjects.

M. P. MOLLER BUYS CRAWFORD CO.

HAGERSTOWN, Md., July 21—The stock of the Crawford Automobile Co. of this city has been purchased by M. P. Moller, a wealthy pipe organ manufacturer, and the plant has been placed under the supervision of Herbert N. Ross of New York. The factory was owned for several years by a corporation in which Moller and Henry Holzapfel, Jr., of this city were the principal stock-

holders. This corporation, it is said, will be dissolved.

Announcement is made by Moller and Ross that in addition to the Crawford car a sport model to be called the Dagmar will be manufactured at the local plant. One of its sport models has been built and is on exhibition in the company's salesrooms in New York.

ADJUSTMENT SAVES GAS

WASHINGTON, July 26—Preliminary reports on efficiency tests, now being conducted by the government, Bureau of Mines, show after a course of experiments in the adjustment of carburetors on government operated automobiles a saving of 25 per cent in the consumption of gasoline.

The tests now being conducted, are made on motor trucks used for hauling coal from the government fuel yard, the cars being in operation for eight hours a day, under ordinary city use. The tests, made under the supervision of G. W. Jones, assistant explosives chemist, reveal the fact that practically all of the 40 automobiles tested were using a mixture too rich in gasoline.

MacDONALD BOOSTS FEDERAL AID

WASHINGTON, July 22.—Federal-aid good roads are being boosted by Thomas H. MacDonald, chief of the bureau of public roads, Department of Agriculture, who is now touring the United States in the interest of better automobile highway transportation. Particular attention to the planning of the federal-aid system of highways, for which meetings will soon be held with officials from various groups of states, is being studied by the good roads chief.

PROTECTIVE LAW PROPOSED

SALT LAKE CITY, Utah, July 23—Automobile and insurance interests will introduce a bill into the next legislature that will have for its object the compelling of a person who purchases a car on the installment plan and falls behind with his payment to disclose its whereabouts on pain of arrest. Under the state law at present there are no means by which a delinquent who conceals the car may be brought to justice.

MOTORCYCLE ON STAMPS

WASHINGTON, July 25—The Postoffice Department has officially recognized the gasoline engine as a factor in transportation by providing that a picture of a motorcycle shall replace that of a bicycle on special delivery stamps. The new issue of stamps will be distributed as soon as the supply of the old issue is exhausted.

FORD DAY IN CHICAGO

CHICAGO, July 26—August 10 will be Ford Day at the Chicago Pageant of Progress. Every Ford agency in Cook county will be closed and all the dealers and their employees will enter floats and banners. Tractors will be featured in the parade in their various uses.

Timely July Rains Help Keep Sales Up in Indiana

Prospects for Good Corn Crop Encourage Farmers Who Begin to Buy Cars

INDIANAPOLIS, July 21—One of the brightest phases of June sales of cars in Indianapolis was that of the used car. Reports from a considerable number of dealer members of the Indianapolis Auto Trade Association show that nearly 20 per cent more used cars were marketed in the city in June than in May. For June 21 dealers sold 368 used cars, while in May 24 who reported, sold but 334 cars.

This cheerful report of actual sales shows that the slight slowing up said to have been encountered in some quarters was not general for the city. State business, according to those distributors who are best organized out in the territory, is said to have gone on at a good rate. Early July sales in the farm regions are picking up considerably. June was dry and hotter than usual. Corn, which is the great crop this year, was in bad shape. On July 4 the dry spell was broken.

The first day after the heavy rain was followed by a flock of orders. One wholesaler said that three men from the farm districts appeared at the salesroom early next morning ready to drive more cars home. Another out of town dealer, as soon as he had satisfied himself that the rain was a regular soaker, ordered seven more. "This is but a sample of the way things have brightened in the farm districts.

Distributor and dealers of this city are looking for splendid business at the State Fair Fall Show the first week of September. This is the real selling show of the year when the farmers are in good shape, and this year promises better than any recent year.

COLUMBUS FALL SHOW

COLUMBUS, O., July 22—Plans for the fall automobile show to be held the week starting Aug. 28 at the Ohio State Fair are going forward under the auspices of the Columbus Automobile Dealers' Co. One of the large buildings at the fair grounds will be used for the exhibit and A. B. Coates is manager.

DEALER'S ESTATE \$130,000

SPRINGFIELD, O., July 23—The estate of the late W. A. Kelley, proprietor of the W. A. Kelley Ford Agency in this city, who died in Arizona a short time ago, is valued at \$130,000, according to an estimate made by the widow in her application for appointment as executrix. The real estate is valued at \$30,000 and the personal property and business at \$100,000. The widow was named executrix in the will. She is the chief beneficiary under the will. W. A. Kelley was for many years a leader in the automobile business here.

War Trucks at "Bargain" Prices Hurt the Industry

Dealers Flooded With Offers From Speculators to Supply Vehicles Shipped From Europe

DETROIT, July 21—Development of the truck business in the United States by manufacturing companies is being seriously handicapped at this time by the presence of the still large stocks of war trucks brought back from Europe by speculating companies. Word has been received in this city of purchase by large fleet owners in recent weeks of war trucks at prices which made competition impossible.

A strong effort is being made by the speculators in war trucks to induce regular dealers in the trucks which they have in stock to handle these at retail to the trade at such profit as they are able to realize. The dealer trade of the entire country is being steadily canvassed by mail to line up a selling organization, and the belief is shared in the industry that with a sales organization formed, the speculators will undertake to bring in many more trucks from abroad.

Price reduction in 5-ton models of two very prominent makes by the speculators in the past few weeks place these at \$1340 and \$1580 respectively, prices which are about on a par with the usual run of 1-ton models. These price changes were broadcasted throughout the country to dealers. The most serious effect of the canvas is that it discourages dealers and is retarding the development of new truck business.

In the face of competition of this kind, truck makers are turning to Washington to seek the passage by the Senate of the Graham resolution, which would impose a 90 per cent duty on these reshipped vehicles. The harm that is being wrought the industry by the presence in this country of the present war trucks is considered as nothing to the damage that would be wrought if the bars against them are permitted to remain down.

At least five companies are known by truck manufacturers to be prepared to bring in these vehicles at the first indication that the truck market is in satisfactory condition to make for ready sale. Investigation by manufacturers has shown that they have control of approximately 30,000 vehicles which they are preparing to bring here.

Truck makers report that they have received information from a reliable source that American trucks are being counterfeited in the Krupp factories in Germany and that these will be shipped back with the war stocks as trucks that were originally made in this country. Because of conditions in Germany and the exchange situation, it is said these trucks can be made up at prices as low as the auction prices on the war trucks.

APPARENTLY A SWINDLER

MOTOR AGE has received a letter from Fred Weed, proprietor of a garage at Victor, Iowa, stating that a man giving the name of F. Elloit was in Victor June 6 soliciting memberships in the "Auto Club of America" and agreeing to make one garage in each town the official headquarters for all members of the club and to have the member garages listed in the Automobile Blue Book. The solicitor was said to have represented that the headquarters of the club were in Chicago. There is no record of such a club in Chicago and the Automobile Blue Book Co. states that it knows of no one by the name of F. Elloit, and that it has no agreement to list garages and provide such service as was promised by this solicitor. Automobile dealers and garage proprietors, if approached on a similar proposition, should investigate carefully to be sure that they are not being swindled.

Demand for Cars Continues Strong at Springfield, Mass.

SPRINGFIELD, Mass., July 20—The demand for cars has continued strong in this territory, and the main difficulty at present lies in inability to make prompt deliveries. Few concerns, handling popular makes are now promising to deliver short of six weeks to two months.

Last winter and spring, when other parts of the country were feeling the depression more severely than the Springfield district, it was easy to get cars in excess of regular apportionments. Now, when the first-mentioned sections are recovering from their stagnation, cars are being sent to them up to their selling capacity, to enable dealers there to get on a firm footing after their season of privation. To do this, it is explained, it has been necessary to cut down New England deliveries. This is not expected to continue long, and the prospects for fall business are bright.

AUTOMOTIVE PIONEER KILLED

PARIS—June 21.—Georges Richard, founder and president of the Unic Automobile Co., was killed this week in an automobile accident near Rouen. Richard, who was 59 years of age, had been closely connected with the French automobile industry from the earliest days. In 1892 he founded the Georges Richard Cycle Co. and entered the automobile field two years later. About 1896 he went into partnership with Brasler and formed the Richard-Brasler Automobile Co., building cars which were very successful in early races.

SPEEDWAY AT HOUSTON

HOUSTON, Tex., July 21—An automobile speedway is being constructed near Houston under the leadership of A. C. Burton. The course is to be 1½ miles in length.

Georgia Bus and Truck Interests Form Association

Dealers and Operators Unite in Transportation Body—Will Oppose Adverse Legislation

ATLANTA, Ga., July 22—Motor bus operators of Georgia who formed a temporary organization at a meeting here in June, held a second meeting the early part of July and effected a permanent organization under the name of the Georgia Motor Bus and Transportation Assn. Its membership includes not only the operators of motor bus passenger and freight lines throughout the state, but also motor truck dealers and distributors, and automobile and accessory dealers. The forming of the organization here marks the initial step in the welding together of these interests.

The following officers were elected for the ensuing year: B. A. Harrison, of Bainbridge, Ga., president; C. P. Vaughan, of Cumming, vice-president; W. M. Riley, of Decatur, secretary; J. O. Smith, of Atlanta, treasurer. The following directors were named: A. L. Belle Isle, R. F. Stuart and W. T. Shackelford, of Atlanta. Percy A. Magahee, secretary of the Georgia Automotive Dealers' Assn., was named executive secretary and attorney for the new association, and will handle this work in addition to his duties for the state dealers.

The principal issue to be carried out by the new organization is a campaign of education in an effort to show the public and the state assembly the advantages of a system of bus lines throughout the state, in order to bring about the defeat of legislation now being considered by the legislative body which is in annual session. This legislation if passed would make the bus a common carrier subject to the same rules and regulations as railroads and under the jurisdiction of the State Railroad Commission;

TRACTORS SHOWN IN MOVIE

PEORIA, Ill., July 22—A two-reel moving picture called "Farming in One Lesson" has been produced by a local concern to show the application of the tractor and other power machinery to modern farming. Its chief character is a young business man who inherits \$5,000 with which he buys a farm and equips it with tractors and other machinery. The use of these machines is shown.

COMMITTEE REJECTS FORD'S OFFER

WASHINGTON, July 21.—The Senate committee on agriculture has rejected by a vote of 9 to 7 Henry Ford's offer for the purchase and lease of the government projects at Muscle Shoals, Ala. Notwithstanding the adverse vote, the Ford proposals will be presented to the Senate for final decision through minority reports.

IN THE RETAIL FIELD

Motor Inn, Inc., Twelfth and Ogden streets, Superior, Wis., has been appointed Marmon dealer.

Meyers Motor Co., 546 Fourth street, Milwaukee, Wis., has been appointed district representative of the Garford truck.

Wm. F. Sims Motor Co., 455-459 Broadway, Milwaukee, Wis., the first distributor of Lincoln cars in the Wisconsin and upper Michigan territory, announces that it has also been appointed an authorized Ford dealer. Separate specialized organizations will render service, it is stated.

Maplewood (Wis.) Auto Co., has been incorporated with \$20,000 capital stock by F. J. Moeller, Joseph Heidman and F. A. Rankin, to deal in motor vehicles, agricultural machinery, etc.

C. P. Miller & Sons, Boscobel, Wis., have started work on a new public garage, sales and service building, estimated to cost \$32,000 complete.

Herman Motor Car Co., Appleton, Wis., will build a two-story fireproof garage and sales building, 80x80 feet, at a cost of \$20,000.

Robert Laubenheimer Garage at Richfield, Wis., was damaged about \$15,000 by fire July 11. It will be rebuilt on a larger scale.

Rusco Mfg. Co., Middleton, Conn., has opened a direct factory parts station at 534 Edison street, Milwaukee, in charge of Henry Kliebhan.

Franklin Ritt Co., Racine, Wis., automotive dealer, has filed a voluntary petition in bankruptcy, scheduling liabilities at \$28,243 and assets at \$1,755. W. H. Lawton, as president, signed the petition.

Herman Toser Co., 564 East Water street, Milwaukee, has been appointed Wisconsin distributor of Armstrong cord truck tires.

M. G. Ellsworth, late of Bloomington, Ill., and Chicago, has purchased the Ford garage in Colfax, Ill., from E. M. Hagar, who has been in charge of the Ford distribution there for seven years. The former will continue the Ford agency and maintenance station.

R. B. Jackson, of Chicago, western sales manager of Rolls-Royce, conferred with officials of the Milwaukee Association of Commerce during the past week on matters relating to the establishment of a distributing headquarters in Milwaukee.

Charles J. Anderson, Danville, Ill., has opened a garage and sales agency at 1 Terrace court, that city and will be in charge of the Illinois and Indiana distribution of the Climber Six automobile, manufactured in Little Rock, Ark. A sales organization is to be built up and other steps taken in connection with wholesale and retail handling.

Central States Co., Davenport, Iowa, has been appointed representative for the Sieberling Tire & Rubber Co., Barberton, Ohio, in this territory.

Skandia Motor Sales Co., Rockford, Ill., has been organized and has opened a sales agency at 1113-15 Fourteenth avenue. J. A. Carlson is president and general manager. The company will distribute Oldsmobiles in the Winnebago county territory.

Annis & Haywood, Inc., a new concern, will conduct the Maxwell and Chalmers agency in Greenfield, Mass.

Carl L. Noyes, formerly manager of the Mansion House Garage, Greenfield, Mass., has opened a repair service in connection with the Hudson-Essex agency in that town.

Hampden Rubber Co., for some time conducted as a Springfield (Mass.) branch of the Standard Tire & Rubber Co., has been bought by a new company of which I. L. Rachelson, the former branch manager, is president and D. E. Newman, formerly of the Citizens' Rubber Co., Boston, is treasurer.

Williams Motor Sales Co., Dodge dealer in Springfield, Mass., has had its sales territory increased by annexing a number of nearby towns in Connecticut. This company reports sales of 535 cars for the year ending July 1, as against 270 for the next best previous year.

Williams Motor Sales Co.'s branch agencies in Palmer, Westfield and Northampton, Mass., now carry Dodge cars exclusively.

Ralph L. Jager has acquired from the Northampton Garage Co., the business of selling Dodge cars in that town as sub-dealer for the Williams Motor Sales Co., of Springfield, Mass.

W. S. Kip Motor Co., 1408 North Broad street, Philadelphia, has been appointed distributor of the National car, which it will handle in connection with the Dort car. The territory includes eastern Pennsylvania, southern New Jersey and Delaware.

Oregon Motors, Inc., has been formed to

handle the Chandler and Cleveland in Oregon and southern Washington. This line was until recently represented by the Twin States Motor Car Company. E. O. Armstrong, Portland business man, is at the head of the company, while A. H. Knaus, formerly in the automobile business here, is vice-president and salesmanager. Knaus for two years headed the Chandler-Cleveland dealership in Portland. The organization of the new company and the franchise with the Chandler was completed recently on the occasion of a visit of Vice-President Graham of the Chandler company.

W. S. Arbogast, who for several years has operated a big accessory department store in Toledo, has taken over the distribution of the new H. C. S. line in this section of Ohio.

A new concern called the Greenfield Oakland Co., has been formed to take over the Oakland agency in Greenfield, Mass. Carroll F. White heads the new concern, which will occupy the same quarters as the old Dunbar-Lyon Co., with maintenance station in connection.

United Tire Jobbers has opened a wholesale and retail tire store in Springfield, Mass. It is under the management of Maurice Ashley, formerly of the Southern Tier Tire Co., Binghamton, N. Y.

Osmond Barringer Co., Charlotte, N. C., has been appointed distributor for the Chandler car in this territory. The company will continue to handle the Peerless and will increase its service department to take care of the new trade.

Motor Accessory Co., Charlotte, N. C., has been made local distributor for Clover Leaf cord tire, manufactured by the Paul Tire and Rubber Co., of Salisbury, N. C.

Columbia Reo Motor Co., Columbia, S. C., has been chartered by the Secretary of State with a capital stock of \$25,000. Officers are J. N. Jordan, president, treasurer and secretary and W. M. Sandifer, vice-president.

Joe Cabiness, Shelby, N. C., has bought the interest of Dewey and Paul Hawkins in the garage of Norman & Hawkins. The name of the firm has been changed to Cabiness & Norman.

South Carolinians bought 821 new automobiles during the month of June, reports to the State Highway Commission show.

Louis C. Block, formerly general manager of the Ford Motor Co., in Philadelphia, has formally opened his place of business at the corner of Race and Broad streets, as distributor of the new Gray car for eastern Pennsylvania, New Jersey, Maryland, and Delaware.

Bland's Auto Exchange, Springfield, Mass., has begun the erection of a new building in the center of the new automobile retail district in that city, which will afford ample accommodations for their business of restoring and retailing used cars. The new quarters will have a frontage of 34 feet with 100 feet depth and 150 feet breadth in the rear.

Flathers Garage Co., Springfield, Mass., will occupy Aug. 1, a large service and repair establishment, operating as an associate of the Parmenter Co., wholesale parts dealers. The proprietor, George H. Flathers, was for some years with the Knox factory and until a few months ago was service manager for the Byrnes Motor Co., Springfield.

Henry Behrens, proprietor of a garage and repairshop in Peshtigo, Wis., and Ervin H. Stibbs of the same city, are organizing a company to manufacture a combination engine stand and burning-in machine designed for service stations by Mr. Behrens. Patents were granted a few days ago.

Clark & Breck Co., distributors of the Winton and Velie cars in Springfield, Mass., have opened a new and larger store in that city, with maintenance station in connection.

The Milwaukee Auto Service Co., 789 Thirty-second street, Milwaukee, distributor of the Velie in Wisconsin, has opened a downtown salesroom at Grand avenue and Eighth street.

Fred W. Schram, Milwaukee, Wis., state distributor of the Saxon Six, has opened new salesrooms at 283 Lenox street, where he has maintained a service station for several months.

The Grant Sales Co., Madison, Wis., has been organized to serve as Grant dealer in Dane and Iowa counties. It has opened headquarters in the A. & B. Garage, 905 Atwood avenue, Madison.

The Jaeger & Wheeler Co., Neenah, Wis., successor to the Valley Inn Garage, Ford dealer, will build a new sales and service building costing \$40,000 at West North Water and North Commercial streets.

Nash Sales Co., Milwaukee unit, for five years wholesale distributor of the Nash in all of Wis-

60 Oakland Branch Managers Meet at Factory to Plan Year

All See Prospect for Good Business to Follow New Contract Season Beginning Aug. 1

PONTIAC, Mich., July 24—Oakland Motor Car Co. branch managers to the number of 60 attended the two-day sales assembly held at the plant here this week. The men came from all over the United States, the convention being in advance of the opening of the new sales year, Aug. 1.

Two business sessions were held daily at the plant, and an evening meeting took place at the Bloomfield Hills Country Club, with C. J. Nephler, general sales manager, in charge, assisted by W. R. Tracy, assistant sales manager.

The branch managers were all very optimistic in their view of the market situation on automobiles for the coming year. They agreed that the autumn months offer a bright prospect for even larger business than has been experienced in the spring, and that the entry of farmers in the motor car buying field is to be expected in a degree sufficient to make August, September and October good months.

DEALERS HOLD SALES CONTEST

MINNEAPOLIS, July 21—In a selling contest by the Willys Overland selling agencies in Minneapolis and St. Paul much interest was stirred. St. Paul won the prizes. George vin Hieda, St. Paul manager, got a gold watch. F. R. Senn won \$100 for selling the most cars and second and third prizes of \$75 and \$50 went to H. F. Clarke and H. H. Weiderholt, respectively.

AUTOMOBILE RACES AT FAIR

KEWANEE, Ill., July 22—The annual automobile races of the Kewanee Fair, will be held here Monday, Sept. 4 (Labor Day) and Saturday, Sept. 9. Purses amounting to \$1800 will be given. On Monday there will be a special 10 mile Ford race in which only regular Fords will be permitted to compete. On the same day there will be a 15 and 25 mile open race with \$1000 in purses. Two races, 15 and 25 mile open, will constitute the program for Saturday with \$800 in purses.

consin and upper Michigan, has now taken over the retail distribution in the Milwaukee territory from the Reece-Nash Co., 481-485 Broadway, Milwaukee.

Parmenter Co., Springfield, Mass., has become distributor for the Spicer and Hartford joints, Perfection Springs and Gurney ball bearings, in addition to the various lines of the Campbell Motors Corp., which they handle exclusively in that territory.

The Downey-Dentz Motor Co., Milwaukee, is a new \$25,000 corporation formed by C. J. Downey, Victor W. Dentz and H. A. Schutte to deal in new and used cars, trucks, etc.

Hale's Auto Service Garage is the style of a new establishment opened by C. W. Hale at 124 North Commercial street, Neenah, Wis.

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

Collecting Bill by Public Auction

Q—We have a car which was put into our shop for repairs last November. We made the repairs and the party asked us to store the car until spring at an agreed rate. Said party came back about May 15, 1922, and said that he could not redeem car as he had no work, but would not give his permission to sell car for storage and repair. We cannot locate him now as he is not at address he had given. We wish to sell car for our bill and as advised by attorney, we are advertising the car for three weeks in local papers and by handbills for public auction. Is there any other procedure we should go through? Can we bid car in at sale, if we wish? How can we give title to car? Will we have to employ a regular auctioneer?—Hootmeirs Repair Shop, Washington, Pa.

A—There appears to be no statute in Pennsylvania giving the repairman or garagekeeper a lien. However, you would have the common law lien, giving you the right to retain possession of the car until your charges are paid. This lien is merely one of holding—giving you the right to hold the car.

Now I can see some hope for you in an old statute of Pennsylvania passed in 1863, and found in Purdon's Digest (1700 to 1903) of the Statute Law of Pa., page 2265. I further note that this statute has been carried forward in the Pennsylvania Statutes complete to 1920 (West Pub. Co.) and placed under the heading of Railways and Canals. Apparently the garagekeeper has been neglected by the legislature of Pennsylvania.

This statute gives you the right to sell at public auction for storage or labor bestowed upon goods, wares and other personal property after 60 days from date of demand made upon the owner for payment of your claim, providing that notice of such sale shall have been published, for three consecutive weeks, in the local newspaper, and by six written or printed handbills, put in the most public and conspicuous places in the vicinity of the property. One has a right to take from the proceeds of the sale his costs in advertising and making the sale, paying the auctioneer, etc., in addition to his lien charges, the balance to be held subject to the order of the owner of the property.

Further, the second part of the statute provides that where the place of residence of the owner of the property or goods is unknown that the lien holder shall make application by affidavit to a judge of the court of common pleas setting forth this fact, and then it shall be lawful for a judge to make an order, to be signed by him, authorizing the sale of such goods or property, upon such

The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of *MOTOR AGE* is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department, but will be supplied by letter.

Technical questions answered by B. M. Ikert, P. L. Dumas and A. H. Packer; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by *MOTOR AGE* organization in conference.

terms as to notice as the nature of the case may admit of and to such judge shall seem meet.

Since you say the owner is no longer at the address he has given you and you do not know where he is, then it would be safer for you to make this application to sell to the court, for your own protection should the owner turn up later and demand his car.

Unless you make this application to the court, there is no further procedure. Many will buy a car under a court order to sell who would not do so otherwise. You should not appear as bidder at your own selling of car. The statute does not require that you have a regular auctioneer. Title is passed by bill of sale. Should attach copy of the newspaper notice to bill of sale.

INSTALLING AMMETER ON 1916 MAXWELL

Q—We have a 1916 model Maxwell on which the magneto has been replaced with Atwater-Kent battery ignition. We tried to install an ammeter on the dash connecting it in series with the No. 2 wire marked dynamo positive. Now when the starter switch is operated the ammeter shows discharge, the hand going off the scale. The starting motor operates alright, however, cranking the engine and when the engine starts the ammeter shows charge up to 10 amperes. What current is this going through the ammeter and how should the meter be connected?—Clark & Shepard, Hopkinsville, Ky.

Instead of connecting the ammeter in series with the wire which attaches to the dynamo positive terminal or No. 2 terminal, the ammeter should be put in series with the small wire which comes from the starting switch up to the battery positive terminal, this being known on Maxwell wiring diagrams as the No. 6 wire. The way you have the meter connected it is apparently carrying current for the shunt field of the machine when it is operating as a starter. This current while fairly heavy is not enough to cause the ammeter any damage, although the other connection would be preferable and would not only show discharge current going to lights but also charge current going to battery.

SPEED AND WEIGHT OF LEXINGTON

- 1—What is the best speed of the series '22 Lexington which sells for \$1,745?
- 2—What is the weight of this car?
- L. R. Standish, Richland Center, Wis.
- 1—70 miles per hour.
- 2—The weight of this car complete is 3,250 pounds.

VARIETY OF QUESTIONS

Q—In testing a connecting rod on an arbor or jig, should not the bearings fit the arbor just snugly with the cap pulled entirely in place?

1—This is correct, as the bearings should fit the crank pins of the testing outfit just as it fits the crankpins of the crankshaft.

2—Where can we get an alignment jig which will be universal and also be accurate for twisted and bent connecting rods?

2—This information will be given by letter.

3—Which type of armature tester do you think is most practical for all around use?—Edgar Best, Fairbury, Ill.

3—A growler combined with telephone receivers is the best general armature test in our estimation.

BUICK D-35 UNIVERSAL JOINTS

Q—We have installed Buick D-35 universal joints. When slowing up or on quick acceleration it sounds like a loose universal especially in low gear. We think it comes from universal working sideways, there is no bearing in forward end of drive tube. The bearings in the transmission are good.—Painter's Garage, Darlington, Ind.

We would advise that you look for a loose pinion or worn keyways on the axle driveshaft or wheel hubs. If both the pinion and keyways are in perfect condition, then carefully examine the universal ball cap plates. As this car is approximately five years old, considerable wear may have developed in the ball cap joint which fits over the universal. The remedy for this is to install a new ball housing and a ball cap.

Room for Storing Cars in Winter

PLAN No. 416

Give us what you would think the best layout for showroom, garage and service station as per enclosed rough sketch.

We would want our showroom at the corner of Broadway and Maryland street, which is going to be one of our best thoroughfares, leading to our best bridge and residential section. We would like a showroom large enough to hold eight to ten cars at least, laid out with a mezzanine office floor, and also sketch with an office on the main floor. We operate a separate used car department, selling from 250 to 350 used cars per year, and carry in stock at all times 25 to 35 used cars. We also sell trucks, and would therefore, want to have a separate battery department and expect to do \$50,000 to \$100,000 worth of business this year, having from three to seven men busy all the time. We would require a stockroom from 30 to 50 ft. at least, carrying a stock of parts, tires, etc., in the neighborhood of \$25,000 at all times. We have an up-to-date and complete shop, employing from 16 to 25 mechanics, with a foreman and assistant foreman.

In view of weather conditions we have to store a number of cars during the winter season, and we would like a storage space large enough to store from 100 to 150 cars.

It is our intention when we are ready to build to erect a two story building over the entire lot which would give us two floors with dimensions of 185x120 feet. We mean to raise the roof of our present garage and to make one complete two-story building.—Breen Motor Co., Winnipeg, Canada.

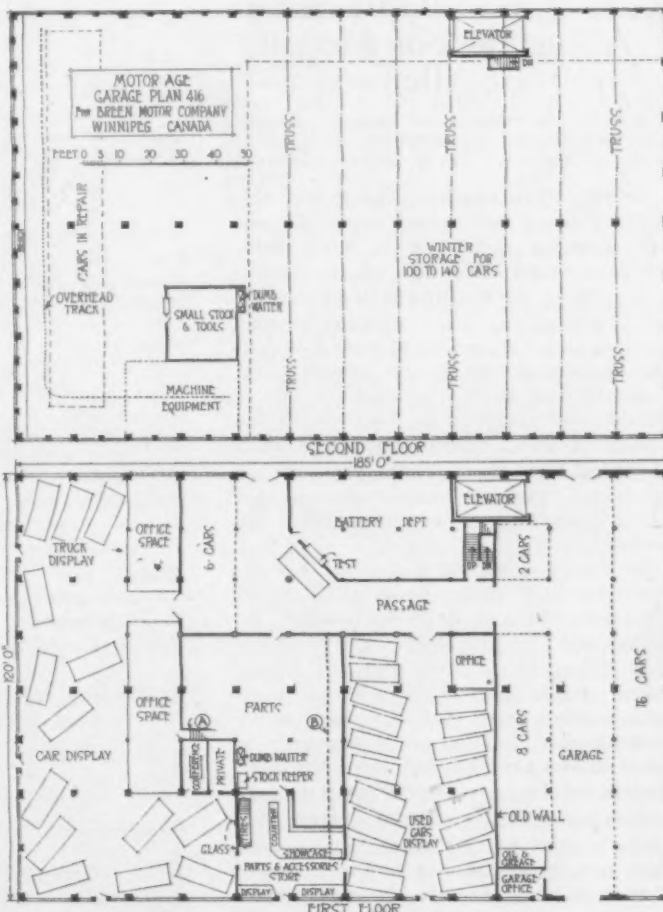
You, no doubt, have a trussed roof on your present building and would prefer to use these same trusses when you elevate the roof for the second story. It would make a much better layout, however, to truss the new building, and if possible the old one, with two sets of 60 ft. spans resting in the center on a row of columns slightly more than 15 ft. on centers.

We would advise building the showroom two stories high in order to take care of the balcony, as this would cut down the area of the upper floor considerably. A showroom of this size should have a ceiling higher than 12 ft., however, and if you think more office space is needed than can be spared, make the ceiling of the whole floor 15 ft. or a little more. In this way a mezzanine office may be had and a double deck stockroom if desired. The idea may be carried out in other departments and at any rate the whole floor will be lighter, more airy and pleasant for the higher ceiling.

We have placed the battery department and stockroom on the first floor so that they would be handier to customers and also leave the second floor free for shop and winter storage purposes. If you have a great deal of transient storage it may be advisable to devote the space to that purpose. It cannot, however, be devoted to any use such as shops or offices where light is required.

You will, no doubt, want another stairway in the front part of the building. (A) would be a good location but that would depend on the addition of a mezzanine office floor which would alter conditions.

One reason for locating the battery shop on the main floor is to make it possible to drive a car up to the test stand

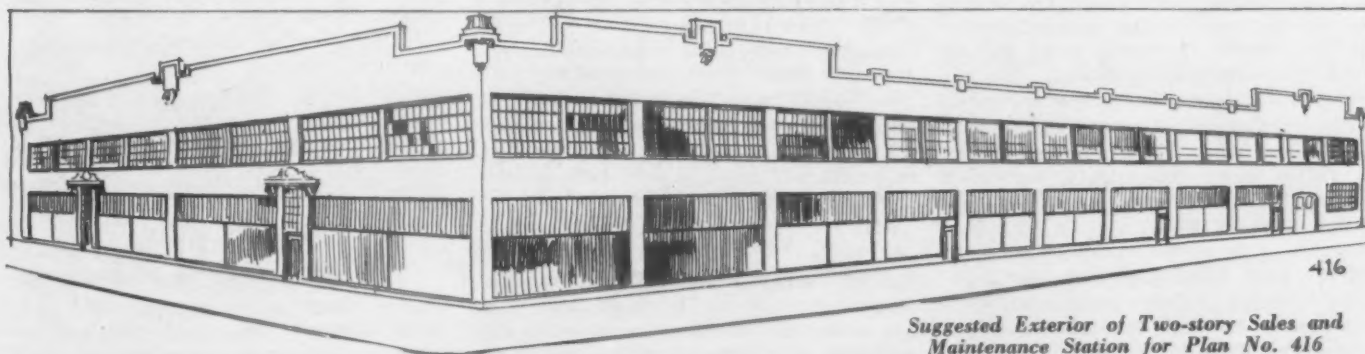


The principal feature of this building is the extensive space for winter storage, necessary in a country where there is practically no winter driving. It would save a great deal of money to partition this section off so that it would not have to be heated to the temperature of the rest of the building

where the battery can be looked over or changed with a minimum of discomfort to the driver.

The columns on the first floor with the exception of the center row are for the support of the second floor only and may be small in size. We suggest the small concrete filled steel columns made from pipe which would be only 4 or 5 inches in diameter.

The used car showroom is narrower than it should be and it might be well to widen it out to (B) or even wider so that cars could be handled easier and the customers would have more chance to see them.



Suggested Exterior of Two-story Sales and Maintenance Station for Plan No. 416

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, maintenance stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how

large it is expected they will be.

Number of cars on the sales floor.

Number of car it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

Timing and Differential Adjustment on Model 37 Allen

Q—Give us the valve setting, timing and differential adjustment on a 1917 Model 37 Allen car.—L. G. Swanson, Perry, Iowa.

1—The valve setting is such that the exhaust valve just begins to open when the piston is just 10 degs. down from top dead center. The 10 degs., of course, is measured on the flywheel and would be $\frac{1}{36}$ th of the total distance around the flywheel. Measured in terms of piston movement, it would probably be about $\frac{1}{16}$ of an inch so that the piston would have come up to top dead center and gone down again about $\frac{1}{16}$ inch at which time the exhaust valve starts to open. The clearance between the valve stems and tappets should be .004 inches.

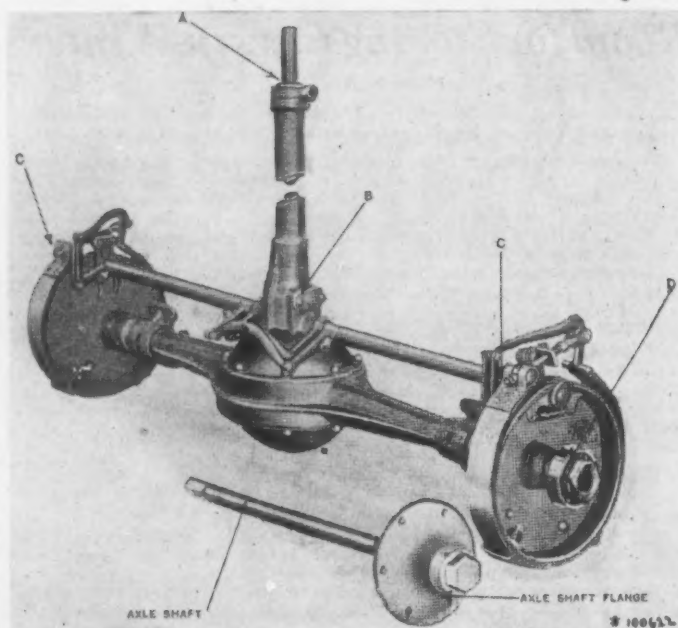
In Fig. 1 is shown method of adjusting differential pinion on the 1917 model 37 Allen. This is done by moving the pinion and the propeller shaft to which it is attached into mesh with the driven gears. To do this, first remove the rear axle housing cover and note the amount of back lash in the gears by moving the large driven gear up and down with the fingers, while the propeller shaft is held stationary at the universal joint. The gears should have a slight amount of back lash, not to exceed $\frac{1}{64}$ of an inch.

If there is an excessive amount of back lash in the gears, remove the locking wire from the propeller shaft front thrust bearing adjusting nut (A) in Fig. 1 and unscrew the nut two or three turns. Next, remove the pinion flange cover plate (B), which acts as a lock for the pinion bearing adjustment nut. Now with a punch or cold chisel, turn the adjusting nut to the right (when looking from front of car); this will move the drive pinion in closer mesh with the driven gear. Be careful not to mesh the gears too tightly, as this will cause them to be noisy and wear excessively. When the adjustment is correct, replace the cover plate (B), but in doing so the adjusting nut must be turned so that the locking nut cover fits either one of the slots in the nut, otherwise the cover cannot be pulled down tightly when the screws are replaced. Do not forget to tighten the propeller shaft, thrust bearing, adjusting nut and replace the locking wire. This nut should not be pulled down too snugly, but only enough to take up the lateral motion of the propeller shaft.

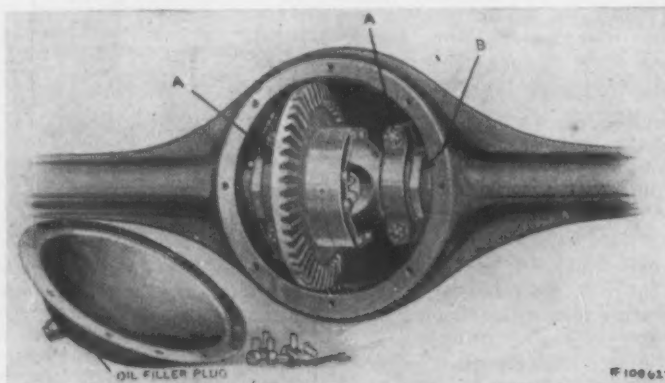
In Fig. 2 is shown a method of moving the large differential ring gear sideways, bringing it into closer mesh with the pinion, in case this should prove necessary. This adjustment is provided so that the large ends of the pinion teeth can be brought flush with the large ends of the teeth of the drive gears.

With the inspection cover removed, the four slotted screws (A) should be loosened and the adjusting nut (B) on the

Fig. 1—Differential Pinion Adjustment, Model 37 Allen



Below—Fig. 2—Differential Ring Gear Adjustment, Model 37 Allen



side toward which the gears to be moved should be backed off a few turns. Now, when the adjusting nut to the left is turned to the right the gear will be moved sideways and in a closer mesh with the pinion. The right hand adjusting nut can now be tightened up again and the lock screws (A) can also be tightened.

CHARACTERISTICS OF INDIANAPOLIS SPEEDWAY

Q—What degree of embankment has the Indianapolis speedway at the curves?

1—The Indianapolis speedway is a $2\frac{1}{2}$ mile brick oval. The straightaways are 3,301 feet long, the turns are 1,320 feet in length and there is a stretch at each end between turns of 640 feet.

The first 50 feet of each turn is banked at 16 degs. 40 min., the remaining 10 feet at 36 degs. 40 min. The approaches and releases from the turn have a 2 per cent grade and the straightaways are perfectly flat. The stretches are 50 ft. wide and the turns, not including the concrete safety aprons, are 60 ft. wide. The official $2\frac{1}{2}$ mi. measurement is made from a point three feet from the inside edge, but the drivers usually use the outside of the straightaway, dropping down as low as possible on the turn. There

are 3,200,000 paving bricks in the track.

2—Will light pistons put an engine out of balance?

2—The weight of pistons will not affect the balance of an engine, generally speaking, that is, pistons of lighter weight than the original piston equipment will not affect the balance, providing that each of the pistons are

of the same weight. Engines are thrown out of balance when the pistons are of a varying weight. The tendency for light pistons is to add the balance of the engine, especially at high speed.

3—Are light pistons easier on the connecting rods and main bearings?—E. V. K., Drumright, Okla.

3—The use of light pistons lightens the pressure on the main and connecting rod bearings and the effect can be likened to the difference between striking an object with a very heavy hammer and striking the object with a smaller or lighter hammer. This effect is very pronounced in the engine because of the fact that the piston must be started and stopped twice in every revolution.

CORRECTION ON METHOD OF REMOVING PISTONS FROM HUDSON

On page 39 of the May 25, 1922, issue of MOTOR AGE there appeared a short article on removing pistons from Hudson Super-Six. In this article it was stated that the pistons could be removed by drawing both pistons and connecting rods up through the cylinders. This is impossible, however, it being necessary to remove the cylinder block and draw the pistons out from below.

Test Lamp Not Suitable for Locating Armature Shorts

Q—In testing out the armature of an Auto-lite starter used on a 490 Chevrolet, we used six-volt test points with one point on one commutator bar and the other test point on any other commutator bar, and found that the test lamp would always light up. Why is this?

1—A test lamp cannot be used on a starting motor to test from bar to bar for short circuits, as the winding itself is a very good connection through the heavy copper strap coil from one commutator bar to another all the way around the armature. This natural connection made by the winding is such a good connection that the lamp will light up no matter whether the armature is perfect or shorted. Starting motor armatures are more difficult to test than generator armatures, and usually require a growler or some buzzer type of armature test which will send alternating magnetism through the armature making a more delicate test than is possible with the use of direct current.

On the starting motor armature, however, it is possible to test for a ground by putting one of the test points on the commutator and the other on the shaft. This is the only way to use a test of this kind.

Testing the Starting Motor

2—In the electrical article on the Chevrolet car in the March 9 issue of *MOTOR AGE*, a method of testing the starting motor for ground was described in which the ground strap was disconnected temporarily and test points used from the positive terminal on the starter to the frame. We made this test and found that the lamp would light up, apparently indicating a ground. When the starter was tried out on the car, however, it worked all right. Explain why the starter would work when there was apparently some trouble in it.

2—If you are sure that the ground was really disconnected, then the lighting of the lamp shows that there was an accidental ground in the circuit somewhere. It is of course possible that the accidental ground was in the field coil and very near to the place where the coil is intentionally grounded at the terminal which is connected to the negative battery. Under these circumstances no appreciable harm would result. It is also possible that there is a slight ground somewhere else which has low enough resistance to carry current for your test lamp but does not carry enough current to appreciably affect the operation of the starter. When you found this condition, you should have disconnected the leads from the brushes and the starter coils from each other until you found which coil was grounded, as this condition may, of course, get worse at any time unless, as previously stated, it is near the natural ground where it can cause no trouble.

Noise in Transmission

3—On a 490, 1920 model Chevrolet there is a noise when driving which seems to be between the clutch and transmission, espe-

cially when the clutch is thrown out. What is the cause of this noise? The car had a new thrust bearing assembly recently installed.

3—The noise is probably due to excessive wear in the pilot bearing in the center of the flywheel at the front end of the clutch shaft. If this bearing is worn it will allow the front end of the shaft to whip around somewhat which, no doubt, makes the noise experienced.

Knock in Sprung Crankshaft

4—How can a knock produced by a sprung crankshaft be detected when the bearings are tight? If the main bearings are tightened up and the shaft is sprung, does the shaft spring up and down before it loosens the bearing or afterwards?

4—A sprung crankshaft is one which is naturally bent, but is forced by the bearing to stay in a straight line. This means that as it rotates it is constantly trying to take a distorted position and in doing so puts an abnormal side strain on the bearing. This causes them to soon become loose and it is at this time the knock occurs. It would, therefore, be our opinion that until the bearings loosened up slightly there would be no knock but it might not take long before this would occur.

To detect a sprung crankshaft while in the car, it would be necessary to remove the center bearing cap and use a dial indicator while the crankshaft is turned over slowly by hand. Variation due to a bend in the shaft would show up on the indicator.

Piston Sizes

5—Explain the figures .0015 to .002 as stated in the June 15 issue of *MOTOR AGE* in regard to 1920 Oakland pumping oil.

5—This refers to eccentricity or egg-shaped condition of the cylinder. For example, an egg might be $1\frac{1}{4}$ inches measured across and $1\frac{1}{4}$ inches measured lengthwise; in other words, $\frac{1}{2}$ inch variation in dimension. In the same way the inside diameter of the cylinder might be 3 inches measured one way and 3.002 measured the other way. Under these circumstances it should be reground as stated in the article.

Compression Ratio

6—What is meant by compression ratio?

6—Compression ratio is the volume or space inside the cylinder when the piston is down divided by the space inside the cylinder when the piston is up.

Lining Up Engine and Transmission

7—Give instructions for lining up the engine with the transmission on 490 Chevrolet—A Wisconsin Subscriber.

7—Two supporting arms from the cylinder block attached to the front of the transmission contain four holes. These holes should be slotted sideways by means of a round file and the transmission and engine should be allowed to center themselves on the clutch shaft. The four bolts can now be tightened and will take their correct place in the slotted holes so that there will be no binding action and the clutch will work freely.

Double Ignition on Ford

Q—There are several small generators that fit the late Ford cylinder blocks and we wish to use one of these instead of the regulation Liberty outfit. We also wish to install ignition outfit to be driven by the generator and would like to know what gear ratio to use in driving the ignition shaft. The timing gears at the front of the Ford engine have 24 teeth, 48 teeth and 16 teeth, respectively. We expect to put double ignition on the Ford engine by putting in an extra set of plugs by welding plug bushings in the head, using Ford magneto on one set and battery ignition for the other set of spark plugs. Advise as to gear ratio in driving from generator shaft to ignition shaft.

1—We doubt if you will secure satisfaction by combining the battery ignition system with the regular Ford system, as the timing will be different in the two systems. The vibrators give a shower of sparks, the first one of which may vary as much as 10 degs. at high speed. The first spark occurring in the cylinder will then fire the gas and the other one is merely wasted.

Our recommendation would be to use one of the battery ignition systems which is used to replace the timer and let it go at that. However, answering your question, would call your attention to the fact that the gear ratio from the crankshaft to the generator is in the ratio of 3 to 2, the number of teeth being 24 to 16. This means that the generator will run exactly $1\frac{1}{2}$ engine speed. We have not checked the exact number of teeth and take your word for it that the above figures are correct.

The shaft of any battery ignition unit should run $\frac{1}{2}$ engine speed and as the generator is running $1\frac{1}{2}$ engine speed you will need a 3 to 1 reduction. The common method of doing this is by means of a worm and spiral gear, the worm having probably 7 threads or teeth on it, which can be seen from the end, and the spiral gear having 21 teeth. In your letter you mentioned a ratio of 32 to 24 teeth. This is wrong, as you are subtracting the 8 tooth difference instead of taking the ratio, which means dividing. Instead of 7 to 21 you could use 8 to 24 or 10 to 30 or any ratio which gives 3 to 1.

2—We have a Hudson 6-54, 1915 model, on which we wish to install a magneto, driving it from the pump shaft. The pump shaft is driven by a gear having 24 teeth. Then there is an idler having 68 teeth driven by the crankshaft gear, which has 24 teeth. What chain and sprocket ratio should we have so as to drive the magneto properly from the pump shaft?—Modern Auto Parts Co., Terre Haute, Ind.

2—Here again we are taking your word for it that the pump shaft goes at exactly engine speed, in which case it would be necessary to have 30 teeth in the sprocket which goes on the pump shaft and 20 teeth in the sprocket which goes on the magneto. This would give $1\frac{1}{2}$ engine speed to the magneto armature shaft. Of course any other ratio giving 3 to 2 would be equally suitable, as, for example, 36 teeth on the pump shaft and 24 on the magneto sprocket. Additional information as to source of supply on these sprockets and chains will be given by letter.

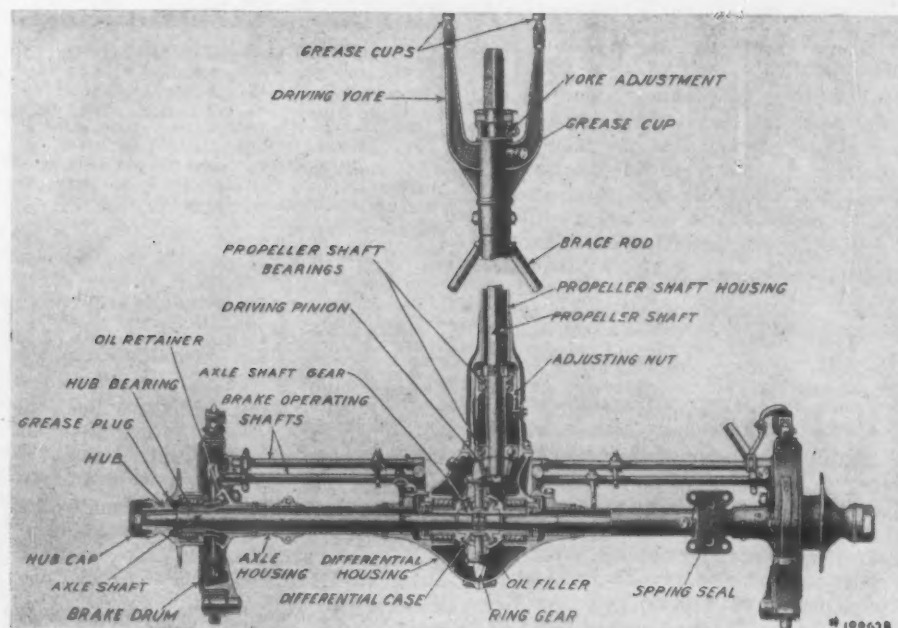


Fig. 1—Rear Axle of Model C-37 Buick

ADJUSTING BUICK C-37 AXLE

Q—Give adjustment and description of Buick C 37 rear axle.

1—A cut of the axle in question is shown above, adjustment being made as follows: Remove inspection plug on left hand differential housing, just behind rear propeller shaft flange, or inspect by painting ring gear with thin white lead or prussian blue, through oil filler hole. The teeth should show this contact clear across their faces. Determine which way gears must be moved to correct mesh. Remove inspection plate on right side of pinion flange, exposing capstan adjusting sleeve, and loosen clamp bolt on left hand side of flange. If pinion is to be moved toward center of gear ring, turn capstan adjusting sleeve to the left. If pinion is to be moved away from center of ring gear, reverse operation. Be sure to tighten clamp bolt and replace inspection plate to lock adjustment.

To adjust position of the ring gear, first remove inner brake shaft brackets to expose adjusting sleeves. Next loosen adjusting sleeve locks. If ring gear is to be moved toward pinion, turn adjusting sleeves to the left. If ring gear is to be moved away from pinion, turn adjusting sleeves in the opposite direction. Always be sure to turn both adjusting sleeves the same amount to prevent spoiling adjustment of thrust bearing. See that adjusting sleeve locks are in place and screws tight before replacing break shaft brackets. To take up end play in the driving yoke, adjust by loosening clamp bolt and removing locking plate. Turn collar to the right. Replace locking plate and tighten clamp bolt.

2—Give adjustment and description of Buick C 37 clutch.

2—The construction of the Buick C-37 is shown in Fig. 2. This is a cone clutch with leather facing, there being

three pockets equally spaced behind the leather facing which contain springs and plungers so as to cause three spots on the leather to project slightly. When the clutch is engaged these three places take hold first, allowing easy engagement without danger of jerking or grab-

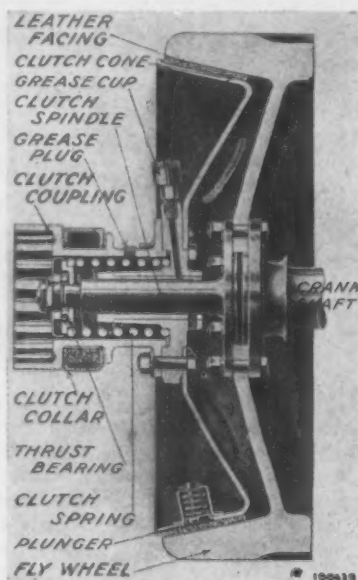


Fig. 2—Buick C-37 Clutch

bing. Operating the clutch pedal pulls the clutch collar backwards or away from the flywheel, thus permitting the engine to turn without driving the transmission or rear axle. No adjustment is provided on this clutch, as the spring takes up by slightly increased motion any wear that takes place on the leather. When the leather facing is badly worn, however, it should be replaced. If the leather facing becomes hard and dry, however, it can be painted with neat-

foot oil, which will soften the leather to make it hold better. If oil or grease, however, should get on the clutch facing and cause it to slip it can be washed with gasoline, and a little Fullers earth can be applied to prevent the slipping. At the rear of the clutch spring is a thrust bearing in connection with which a felt washer is used. This is lubricated by means of an oil hole adjacent to the clutch collar which should be oiled with 600W or a thin grease which is not too heavy. If this felt washer is allowed to become dry it makes gear shifting hard, as the clutch is stopped too quickly.

3—How can squeaking of generator brushes be eliminated?—Ed Landy, Minneapolis, Minn.

3—We know of no definite way to eliminate squeaking, but have sometimes accomplished an improvement by sandpapering the commutator and the brush surface which rubs on the commutator.

Mystery Tale Solution

PECULIAR ACTION OF TAIL LIGHT

On page 46 of the May 25 issue of MOTOR AGE there was printed a mystery tale in regard to the peculiar action of the tail light of a 1919 Haynes and the following solution is presented.

If the ground on the generator brush had been a good connection the action of the tail light would not have depended on the operation of the ignition switch. We, therefore, assume that the ground was due to carbon dust and was of high resistance and, therefore, does not enter into our problem. It will be noticed that the tail lamp has one wire permanently connected to negative battery. We must therefore, find some way in which the positive battery can get a connection to the other tail light wire. It is universally understood that one ground in a two wire system does not do any harm, therefore, in addition to the grounded interrupter contact, there must have been another ground. The first assumption would be that the left wire on the tail light was grounded, but on taking this matter up with Mr. Beard, a test was made and it was found that there was no ground here. Another possibility, however, presented itself, this being that one of the connections from the tail light and switch up to the head light was grounded and on further inspection a place was found where it appeared that a ground had existed. We now conclude that this ground must have been on the right wire of the left head lamp or the left wire of the right head lamp. This would allow current to flow from positive battery through the ammeter to circuit breaker, ignition switch and the ground in the interrupter over to the ground in the head light wiring and through the left head lamp and the tail lamp back to negative battery. Current operating the tail lamp would not be enough to operate the left head lamp. We now have another question, however, for from a ground in between the head lamp there is also a circuit through the right head lamp back to negative battery, and

if this does not light, we will have to assume that this ground also had a certain amount of resistance in it, such as would be due to a ground in a cable covered with armor where the current has to go through the spiral metal covering which protects the wire. MOTOR AGE wishes to express appreciation for the answers received, which have been more or less in accord with our solution.

Definition of Candlepower

Q—What is the h.p. of the Fordson tractor?

1—According to the test conducted by the University of Nebraska, Agricultural Engineering Dept., the Fordson tractor showed a maximum h.p. of 18.70 at a speed of 1007 r.p.m. on a brake test.

2—Explain the term "candlepower" in lighting system.

2—The answer to this question appeared in the Jan. 26, 1922, issue of MOTOR AGE. It is herewith reprinted for your information. Candlepower is a unit of measurement and is the ratio of the intensity of the light in question to the intensity of the light of one standard candle in one direction only, and will be the same in any other infinite number of directions in space.

Candlepower, then, is no indication of the quantity of light, but only its intensity in any certain direction, regardless of the distance from the source. Illumination is the effect or result of light, and the unit for measurement is the foot candle. The foot candle represents an intensity of illumination equal to that produced at a point on a plane which is one foot distant from a source of light equivalent to one candlepower, and which is perpendicular to the ray of light at that point.

Distance and candlepower have a direct bearing on the intensity of illumination. If the distance between the plane to be illuminated and the source remain the same and the intensity of the source or the candlepower is changed, the intensity of the illumination or the foot candles will vary in the same proportion. If the candlepower remains the same but the distance between the source and the plane is doubled, the same quantity of light must cover four times as much surface.

Briefly, then, the foot candles vary directly as the candlepower and inversely as the square of the distance between the source and the plane to be illuminated. The average beam candle power of the average automobile headlight is 30,000.

The headlamp candlepower, or foot candlepower, is measured by the foot candlepower, which is a modification of the old-time photometer.

3—Would uneven compression cause a knock in a new Ford car?

3—If all bearings and pistons were tight uneven compression would cause no noticeable knock in a Ford engine.

4—Give instructions for removing old bushings from pistons using a vise.

4—When removing piston pin bush-

ings from the average thin wall piston, it is advisable to saw the bushing to as near the bottom of the bushing wall as possible and then drive the bushing out with a suitable drift. The principles to be followed are that as little strain as possible should be directed against the piston. Piston pin bushings may be inserted in the piston by means of a threaded bolt which has a large head at one end sufficient to permit the passage of the bushing over the bolt.

This bolt is attached to the piston pin

bosses and by the aid of a washer of suitable soft material on the opposite end a nut is turned up on the thread and the bushing is forced into the piston pin bosses. Another method is to use a very small arbor press. Any of these operations may have caused the piston to spring out of round and it is advisable to check the circularity of the piston with micrometers before it is installed.

5—How close should Ford tappets be set cold?—A Wisconsin Subscriber.

5—The recommended clearance for the Ford engine is .018 to .022.

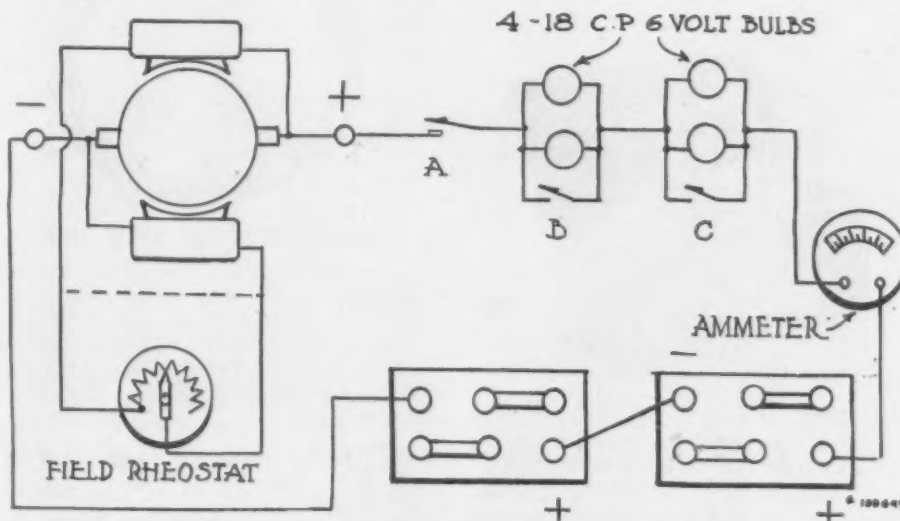


Fig. 3—Battery Charging Circuits With 20 Volt Generator

Using a 20-Volt Generator for Battery Charging

Q—We have a 20-volt, five-ampere D. C. generator and would like a diagram showing how to charge storage batteries with it.

1—In Fig. 3 is shown a two pole generator with two brushes connecting to plus and minus terminals. It is also shown as having two field coils the circuit of which was formerly from the plus and minus terminals. It is also down at the left and across the dotted line to the lower field coil and back to minus brush. As shown in this sketch, however, the connection represented by the dotted line has been cut and a field rheostat has been connected in the field circuit.

If the generator in question is either two or four pole it will no doubt be possible to use some similar method, putting a field rheostat in the field circuit. This may be a matter of experiment, but the rheostat should be capable of cutting the generator voltage from 20 down to 6 or 7 volts so as to be suitable for one battery. After the battery has been connected the field rheostat can be adjusted to give the proper charge rate as shown by the ammeter.

In case it is not possible to get a field rheostat and cut it into the circuit as indicated, then the scheme shown at the upper right hand portion of the circuit can be used. This comprises a switch "A" and the four headlamp bulbs connected as indicated. For charging one

6 volt battery we would then have switch "A" closed and switches "B" and "C" would be open.

The 20 volt generator would then be lighting up the four headlamp bulbs and would be charging the battery. This is assuming that no field rheostat is available. In charging two batteries switch "A" and "B" would be closed and "C" would be open. The generator would then be lighting the two lamp bulbs shown just above "C" and would be charging the two 6 volt batteries. For charging three batteries switches "A," "B" and "C" could all be closed and the generator would then charge three batteries.

If no more than 20 volts is available from the generator, however, the batteries could not be charged very well, but if the generator speed can be increased slightly so as to get possibly 24 volts it will then be possible to bring the three batteries up to a fully charged condition. The field rheostat or the use of lamps should be used but both methods would hardly be necessary.

2—We have in mind installing a battery repair outfit and have about \$100 to do it with. Advise what equipment could be purchased for this sum which would enable us to start this work.—P. V. Dawson, the San Rafael Public Schools, San Rafael, Calif.

2—This question will be answered by letter.

The ACCESSORY SHOW CASE

New Sources of Retail Profit

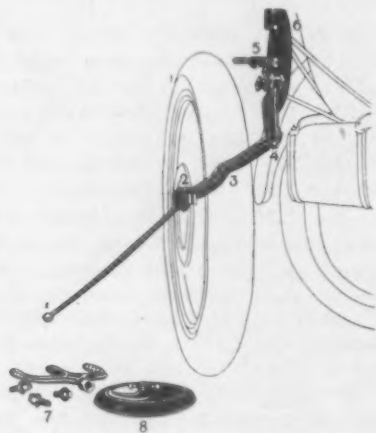
STEFFCO TOURIST PRODUCTS

The Steffco line includes the food container shown and clothes baggage for the motorist. George V. Steffens Co., 112 N. 15th st., St. Louis.



LAWRENCE TIRE CARRIER

A combination tire carrier and lifting device. The device is interchangeable with the present carrier for disk wheels and combines also the feature of a lifting device which allows a disk wheel to be lifted in place or lowered with the lever. Lawrence Carrier Corp., 20 E. Lake Street, Chicago, Ill.



ALEMITE LUBRICATING SPRING COVER

A spring cover of all metal construction being made of lead-coated, non-rusting steel. There is no fabric or leather and the covers do not need to be removed to be refilled. An Alemite connection is fitted at the bottom and grease forced in by the use of the regular Alemite gun. Made in individual sets for all makes and models of cars. Bassick Mfg. Co., 2650 North Crawford Ave., Chicago.



GRAYNIE SPARE TIRE LOCK

A spare tire lock consisting of chain which is hardened to resist cutting and furnished with a lock approved by the Underwriters. Price \$6.75 to \$9, according to length. The Graynie Corp., 323 W. Jackson Blvd., Chicago.

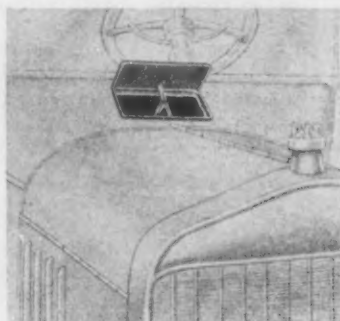


HUSKEE GASOLARM

The Gasolarm is put into the gasoline tank and when the supply is at a set level, a bell rings, warning the driver. It can be made to ring at any level between one and five gallons of gasoline. Huskee Tool Mfg. Co., 2345 Fullerton Ave., Chicago.

HOOF TOWN PLATES

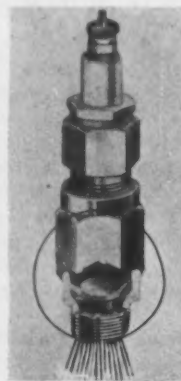
The town plates are made of durable metal, embossed and enameled the same color as State license tags. Also furnished in black and white or desired color combination. Made without sharp corners. Price, 50c per plate; \$1 per pair. John C. Hoof & Co., 157-159 West Illinois St., Chicago



O. K. Ventilator

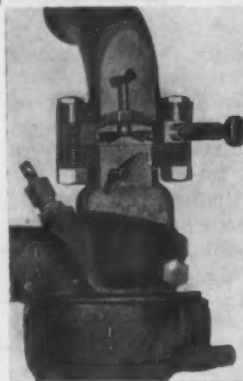
O. K. VENTILATOR

A semi-hardening cement is used to make the ventilator waterproof, thereby eliminating gaskets. It is adjustable to any position from driver's seat. Enameled in black with two coats baked on, \$3.00. R. D. Boyd Corp., 2660 Washington Ave., St. Louis, Mo.



STAR SPARK PROTECTOR

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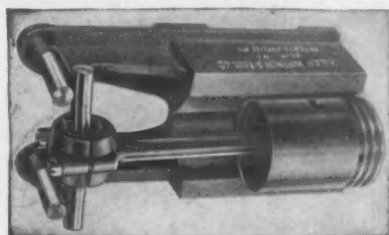
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The drum is mounted on a stand that has two wheels at the back and two supports in the front. It will stand in any position or by raising the front legs off the floor the tank can be wheeled about quite easily. Underneath the tank is a compartment for cans, measures, etc. Price \$60. Midway Mechanical Co., 1555 Selby Ave., St. Paul, Minn.



ALLEN CONNECTING ROD ALIGNING AND STRAIGHTENING FIXTURE

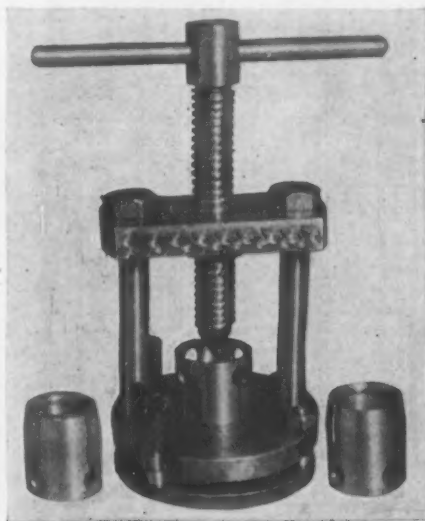
Different size bushings show testing of connecting rods for different size crankshafts. Price \$55 with three bushings. Extra bushings \$2.25 each. Allen Wrench & Tool Co., Providence, R. I.



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Little Giant Pipe Wrench

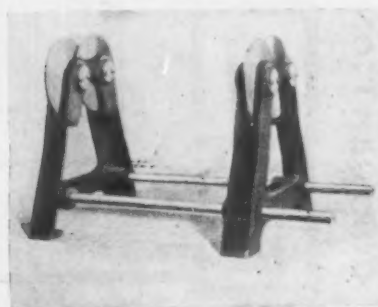


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race of the ball bearing. The inner race having a very small diameter, gives to the disks the sensitiveness necessary for balancing work. The spindles and races are hardened and will not become indented by the ball bearings when weights are placed upon the disks. The disks are made of chilled iron, ground true on the face and in themselves are accurately balanced.

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The ACCESSORY SHOW CASE

New Sources of Retail Profit

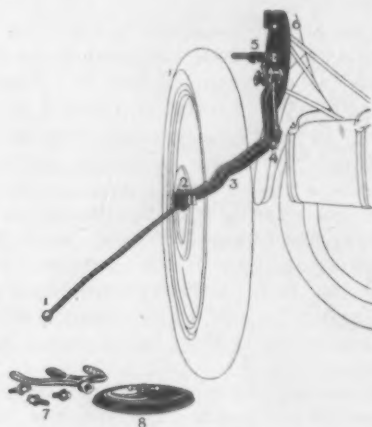
STEFFCO TOURIST PRODUCTS

The Steffco line includes the food container shown and clothes baggage for the motorist. George V. Steffens Co., 112 N. 15th st., St. Louis.



LAWRENCE TIRE CARRIER

A combination tire carrier and lifting device. The device is interchangeable with the present carrier for disk wheels and combines also the feature of a lifting device which allows a disk wheel to be lifted in place or lowered with the lever. Lawrence Carrier Corp., 20 E. Lake Street, Chicago, Ill.



ALEMITE LUBRICATING SPRING COVER

A spring cover of all metal construction being made of lead-coated, non-rusting steel. There is no fabric or leather and the covers do not need to be removed to be refilled. An Alemite connection is fitted at the bottom and grease forced in by the use of the regular Alemite gun. Made in individual sets for all makes and models of cars. Bassick Mfg. Co., 2650 North Crawford Ave., Chicago.



GRAYNIE SPARE TIRE LOCK

A spare tire lock consisting of chain which is hardened to resist cutting and furnished with a lock approved by the Underwriters. Price \$6.75 to \$9, according to length. The Graynie Corp., 323 W. Jackson Blvd., Chicago.

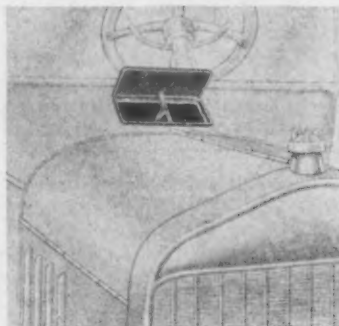


HUSKEE GASOLARM

The Gasolarm is put into the gasoline tank and when the supply is at a set level, a bell rings, warning the driver. It can be made to ring at any level between one and five gallons of gasoline. Huskee Tool Mfg. Co., 2345 Fullerton Ave., Chicago.

HOOF TOWN PLATES

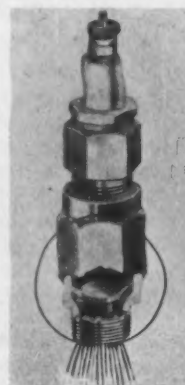
The town plates are made of durable metal, embossed and enameled the same color as State license tags. Also furnished in black and white or desired color combination. Made without sharp corners. Price, 50c per plate; \$1 per pair. John C. Hoof & Co., 157-159 West Illinois St., Chicago



O. K. Ventilator

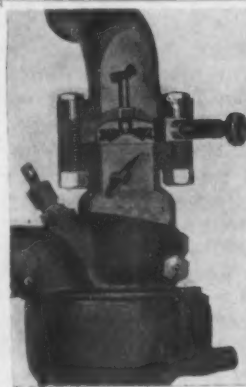
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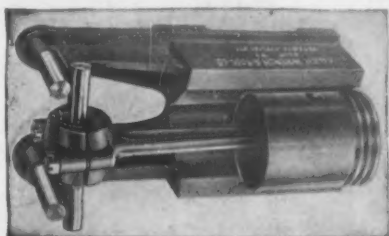
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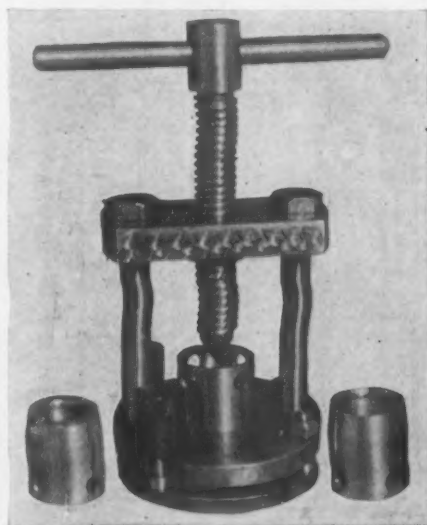
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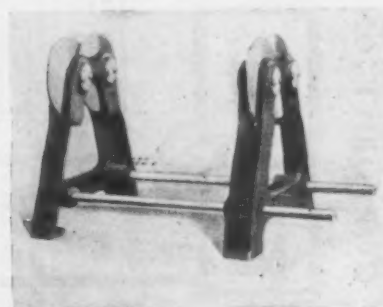


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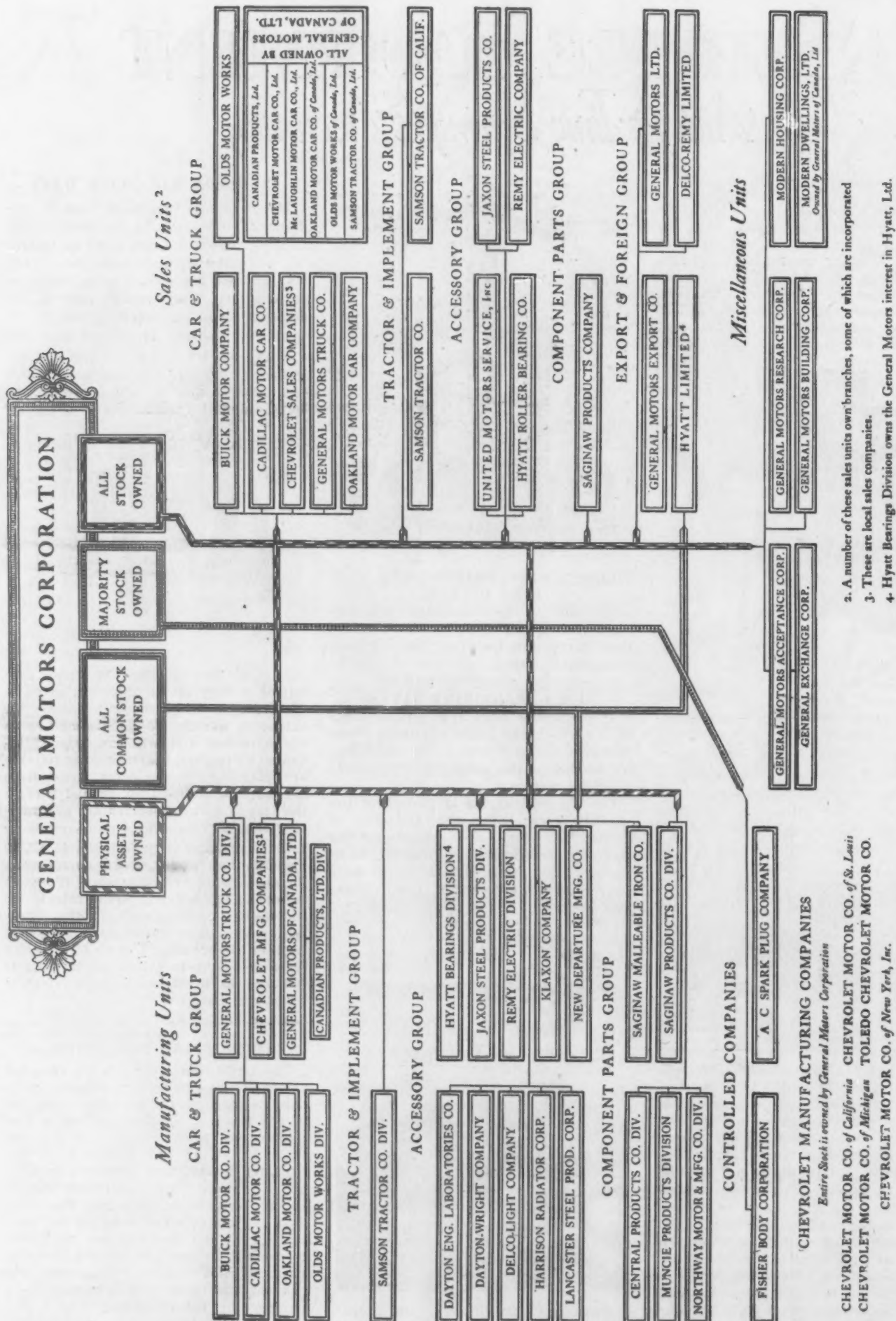


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COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Toronto Canadian Nat'l Exhibition Aug. 26-Sept. 1
Columbus, O.	..... Columbus Auto Dealers Co.	..... Aug. 28-Sept. 3
Decatur, Ill.	..... Industrial Exhibition and Automobile Show	..... Aug. 30-Sept. 9
Indianapolis	..... Indianapolis Automobile Trade Assn.	..... Sept. 4-9
Wilmington, Del.	..... Delaware State Fair	..... Sept. 4-9
Hartford, Conn.	..... Connecticut Fair Grounds	..... Sept. 4-9
Spokane, Wash.	..... Annual Show	..... Sept. 4-9
Memphis	..... Memphis Automobile Dealers' Assn.	..... Sept. 23-30
Wash'gton, City of Closed Car Salon	.....	..... Oct. 21-28
Chicago	..... Annual Show of the Automotive Equipment Association	..... Nov. 13-18
New York	..... Annual Show	..... Jan. 6-13

Chicago	..... Annual Show at Coliseum	..... Jan. 27-Feb. 3
N. A. C. C.	.....	.....

FOREIGN SHOWS

Berlin	..... Kaiserdamm Hall	..... Sept. 25-Oct. 3
Rio de Janiero	..... Automotive Exhibition	..... Sept., 1922
London	..... International Commercial Vehicle Exhibition	..... Oct. 12-13
Paris, France	..... Automobile Show	..... Oct. 4-15
London	..... Annual Show	..... Nov. 3-11

RACES

Colo. Spgs., Colo.	..... Pike's Peak Race	..... Sept. 4
San Carlos, Cal.	..... 500-Mile Armistice Day Race	..... Nov. 11

New Contracts for All Units of General Motors Dealers

Late Dealer Papers Will Not Call for Renewal, But Will Make Required Changes

DETROIT, July 24.—Following a series of conferences between executives of the several car manufacturing divisions of the General Motors Corp., a contract with dealers has been developed which will embody the best features of former contracts of the several units, and make them available to dealers in all cars made by the five divisions of the corporation.

The contract itself is made in perpetuity with the dealer and can only be canceled for cause. Each division will continue as formerly to enter into contracts with its dealers and these contracts will be filed with the division headquarters. Complete authority in the merchandising of its products is vested in the producing division.

Under the new form of dealer relationship, there will be no renewing of contracts at stated intervals, but instead, changes that may be advisable from time to time will be made in the form of appendices to the contract proper. These will vary according to the needs of the particular manufacturing division.

An outstanding feature of the contract is that it provides discounts according to the volume of business done by the dealer. There is a sliding scale which gives to every dealer an opportunity to increase his earnings by increasing his business. In providing for this the corporation wished every man to know the basis upon which he was doing business.

PLANS FOR NEW YORK FALL SHOW

NEW YORK, July 22.—Virtually all space available in Grand Central Palace has been sold for the inclosed car show of the Automobile Merchants' Association of New York, which will be held Sept. 25 to 30. This is the first time the Metropolitan dealers have attempted anything so elaborate as a closed car show in the Palace, scene of the mid-

winter show, conducted by the National Automobile Chamber of Commerce.

It is planned to charge an admission of 75 cents, with dealers' tickets for distribution to prospects at 35 cents. Space will sell for \$1 a square foot.

The show plans are being made by a committee including Charles H. Larson, Oldsmobile, chairman; Harry W. Gaston, Lexington, vice-chairman; H. T. Porter, Lafayette; Harry S. Houghton, Hudson-Essex; William C. Poertner, Durant and National; Lee J. Eastman, Packard, and E. P. Herman, Stewart truck. It has not yet been decided whether there will be an exhibition of trucks in connection with the show.

Safety Campaign Directed at "Jay-Walkers" in Cleveland

CLEVELAND, July 22.—The entire community has been united under the leadership of the Safety Council of the Cleveland Chamber of Commerce in a drive to make the pedestrians obey traffic laws.

The campaign was organized by Adam Lintz, secretary of the Safety Council, but a share of the credit for the movement is given M. F. Bramley, president of the Templar Motor Car Co., and president of the safety council.

On all down town posts, pasteboard crosses similar to those found at steam railroad crossings, have been placed. Eighteen hundred of these are doing duty in the city. These warn pedestrians to "stop, look and live," "Don't Jay-Walk" and "Avoid Accidents."

One thousand boy scouts have volunteered for service and they are distributing cards bearing this warning: "Don't be a Jay-Walker. Please cross at crossing; it helps to reduce accidents."

TO RUN FARM WITHOUT HORSES

PEORIA, Ill., July 24.—C. C. Merillat, farmer residing 30 miles north of here, will demonstrate to his neighbors that a farm can be operated without horses. All the farm work will be done by tractors and the crops hauled by truck, according to his plan, and the experiment is being watched with interest by farmers throughout this district.

Recent Price Changes in Cars, Trucks and Tractors

CEDAR RAPIDS, Ia., July 22.—The Beck-Hawkeye Motor Truck Works has made the following price revisions on three of its models:

Model	Old Price	New Price
1½-ton	\$2050	\$1725
2-ton	2150	1810
2½-ton	2850	2395

Lower Tractor Prices

MANSFIELD, Ohio, July 21.—The Aultman & Taylor Machine Co. has cut the price of its 15-30 tractor from \$2,200 to \$1,900; its 22-45 tractor from \$3,400 to \$2,800, and the 30-60 from \$4,500 to \$4,000.

Power Truck Reductions

GREENVILLE, Mich., July 17.—Price revisions made by the Power Motor Truck Co., follow:

Model	Old Price	New Price
1½-ton	\$2900	\$2000
2½-ton	3200	2475
3½-ton	4100	3475

Kline Car Changes

RICHMOND, Va., July 19.—The Kline Car Corp. has cut the price of its two, five and seven-passenger touring cars from \$1,970 to \$1,690. The coupe has been reduced from \$2,850 to \$2,750, but no change has been made in the price of the sedan.

Huber Tractor Reduced

MARION, Ohio, July 20.—The price of the light four tractor, manufactured by the Huber Mfg Co., has been reduced from \$1,185 to \$985.

TRUCK SALES INCREASE

CLEVELAND, O., July 22.—The White Motor Co. reports that its truck sales for the second quarter ending June 30, shows an increase of 40 per cent over the first quarter of this year and 23 per cent over the second quarter of 1921. The month of June was the best since September, 1920. The company expects by October to be on a production basis of more than 10,000 trucks a year.

Specifications of Current Motor Truck Models

NAME AND MODEL							NAME AND MODEL							NAME AND MODEL						
Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive						
Front	Rear	Front	Rear	Front	Front	Rear	Front	Rear	Front	Front	Rear	Front	Rear	Front						
Acason.....RB	1 1/2	\$1650m	3 1/2 x 5	34x5m	31x5m	W	Corbitt.....AA-22	5	\$1500	3 1/2 x 6	36x6	40x6d	W	Gramm-Pion.....20	2	\$2025m	3 1/2 x 5 1/2	36x4k	36x7k	W
Acason.....H	2 1/2	1950	3 1/2 x 5 1/2	36x3 1/2	36x6	W	Day-Elder.....AS	1 1/2	1600	3 1/2 x 5	35x5m	35x5m	W	Gramm-Pion.....30	3	3275m	3 1/2 x 5 1/2	36x4k	36x4dk	W
Acason.....L	3 1/2	2750	3 1/2 x 5 1/2	36x4k	36x8k	W	Day-Elder.....B	1 1/2	2000	3 1/2 x 5	34x3 1/2	34x5	W	Gramm-Pion.....75P	3 1/2	4225m	3 1/2 x 5 1/2	36x6m	42x9m	W
Acason.....M	5	3450	3 1/2 x 5 1/2	36x5k	36x10k	W	Day-Elder.....D	2	2400	3 1/2 x 5 1/2	36x4	36x7	W	Gramm-Pion.....40	4	3995m	3 1/2 x 5 1/2	36x5	36x5dk	W
Ac.....C	1 1/2	4350	3 1/2 x 5 1/2	36x6	40x12	W	Day-Elder.....C	2 1/2	2750	3 1/2 x 5 1/2	36x4	36x7	W	Gramm-Pion.....50	5-6	4895m	3 1/2 x 5 1/2	36x6	40x6dk	W
Ac.....A	2 1/2	2295	3 1/2 x 5 1/2	31x3 1/2	31x5k	W	Day-Elder.....F	3 1/2	3150	3 1/2 x 5 1/2	36x5	36x5d	W	Hahn.....B2	1	1750	3 1/2 x 5	34x5k	34x5k	W
Acme.....20	1 1/2	.....	3 1/2 x 5	35x5m	35x5m	W	Day-Elder.....E	5	4250	3 1/2 x 5 1/2	36x5k	40x6dk	W	Hahn.....O	1 1/2	2150	3 1/2 x 5 1/2	36x3 1/2	36x6k	W
Acme.....30	1 1/2	.....	3 1/2 x 5	34x3 1/2	34x5	W	Dearborn.....E	1 1/2	1600	3 1/2 x 5 1/2	35x5m	35x5m	W	Hahn.....K	2	2550	3 1/2 x 5 1/2	36x7k	36x8k	W
Acme.....40	1 1/2	.....	3 1/2 x 5	34x3 1/2	34x5	W	Dearborn.....FX	1 1/2	2300	3 1/2 x 5 1/2	34x4	34x5	W	Hahn.....L	3	3250	3 1/2 x 5 1/2	36x5k	36x8k	W
Acme.....60	3	.....	3 1/2 x 5 1/2	36x4	36x7	W	Dearborn.....F	1 1/2	2180	3 1/2 x 5 1/2	34x4	34x5	W	Hahn.....M	5	3850	3 1/2 x 5 1/2	36x5	36x10	W
Acme.....60L	3	.....	3 1/2 x 5 1/2	36x4	36x7k	W	Defiance.....48	2	2590	3 1/2 x 5 1/2	34x4 1/2	34x7	W	Hahn.....N	6	4650	3 1/2 x 5 1/2	36x6	40x12	W
Acme.....90	4 1/2	.....	3 1/2 x 5 1/2	36x5	40x10	W	Defiance.....G	1	1095m	3 1/2 x 5	35x5m	35x5m	B	Hal-Fur.....E	1 1/2	2350	3 1/2 x 5 1/2	34x5m	38x7m	W
Acme.....125	6 1/2	.....	3 1/2 x 5 1/2	36x6	40x12	W	Defiance.....D	1 1/2	2095m	3 1/2 x 5	35x5m	36x6m	B	Hal-Fur.....B	2 1/2	3000	3 1/2 x 5 1/2	36x6m	36x8	W
American.....25	2 1/2	3350	4 x 6	36x4k	36x5dk	W	Defiance.....E	2	2275m	3 1/2 x 5	35x5m	38x7m	B	Hal-Fur.....F	3 1/2	4000	3 1/2 x 5 1/2	36x6m	40x10	W
American.....40	4	4275	3 1/2 x 5 1/2	36x5k	36x5dk	W	Denby.....31	1 1/2	1485	3 1/2 x 5 1/2	35x5m	35x5m	B	Hall.....1 1/2	1 1/2	3100	3 1/2 x 5 1/2	34x5m	38x7m	W
Armleder.....20	1 1/2	2350	3 1/2 x 5 1/2	34x3 1/2	34x5k	W	Denby.....33	1 1/2	2145	3 1/2 x 5 1/2	35x5m	38x7m	B	Hall.....2 1/2	2 1/2	3275	3 1/2 x 5 1/2	36x4	36x6	W
Armleder.....21	1 1/2	2425	3 1/2 x 5 1/2	34x3 1/2	34x5k	W	Denby.....34	2	2395	3 1/2 x 5 1/2	36x3 1/2	36x6	B	Hall.....3 1/2	3 1/2	4100	3 1/2 x 5 1/2	36x5	36x5dk	W
Armleder.....40	1 1/2	2850	3 1/2 x 5 1/2	34x3 1/2	34x5k	W	Denby.....35	2 1/2	2795	3 1/2 x 5 1/2	36x4	36x7	B	Hall.....7	7	6100	3 1/2 x 5 1/2	36x5	40x6d	W
Armleder.....HW	3 1/2	3200	3 1/2 x 5 1/2	36x4k	36x7k	W	Denby.....27	4	3895	3 1/2 x 5 1/2	36x5	36x5d	B	Harvey.....WOA	2	2650	3 1/2 x 5 1/2	34x4	34x7	W
Armleder.....KW	3 1/2	4150	3 1/2 x 5 1/2	36x4k	36x7k	W	Denby.....210	5	4295	3 1/2 x 5 1/2	36x6	40x6d	B	Harvey.....WFA	2 1/2	2950	3 1/2 x 5 1/2	36x4	36x7	W
Atlas.....MD	1 1/2	1185	3 1/2 x 5	36x4 1/2	32x4 1/2	W	Dependable.....A	3 1/2	1050	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Harvey.....WHA	2 1/2	3950	3 1/2 x 5 1/2	36x4	36x5d	W
Atterbury.....20R	1 1/2	2475	3 1/2 x 5	36x4 1/2	34x5	W	Dependable.....C	2	2350	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Hawkeye.....K	1 1/2	1850	3 1/2 x 5 1/2	34x3 1/2	34x5k	W
Atterbury.....7CX	1 1/2	3175	3 1/2 x 5 1/2	36x4	36x4d	W	Dependable.....D	2 1/2	2650	3 1/2 x 5 1/2	34x5	36x6	W	Hawkeye.....M	2	2650	3 1/2 x 5 1/2	36x4k	36x6k	W
Atterbury.....22C	2 1/2	3375	3 1/2 x 5 1/2	36x4	36x4d	W	Dependable.....E	3	2950	3 1/2 x 5 1/2	34x6	36x7	W	Hawkeye.....N	3 1/2	3700	3 1/2 x 5 1/2	36x5k	36x10k	W
Atterbury.....7D	3 1/2	3975	3 1/2 x 5 1/2	36x5	40x5d	W	Diamond T.....O-3	1-1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2	36x4m	W	Hendrickson.....C	2 1/2	2200	3 1/2 x 5 1/2	36x4k	36x7k	W
Atterbury.....22Q	3 1/2	4275	3 1/2 x 5 1/2	36x5	40x5d	W	Diamond T.....T	1 1/2	2250	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Hendrickson.....N	2 1/2	2690	3 1/2 x 5 1/2	36x4k	36x7k	W
Autocar.....8E	5	4075	3 1/2 x 5 1/2	36x5	40x5d	W	Diamond T.....U	2-2 1/2	2650	3 1/2 x 5 1/2	36x4	36x7	W	Hendrickson.....K	5	4000	3 1/2 x 5 1/2	36x6	40x6	W
Autocar.....21UG	1 1/2-2	1950	3 1/2 x 5 1/2	34x4 1/2	31x5k	D	Diamond T.....K	3 1/2	3750	3 1/2 x 5 1/2	36x5	40x6d	W	Huffman.....B	1 1/2-2	1795	3 1/2 x 5 1/2	34x3 1/2	34x6	W
Autocar.....21UG	1 1/2-2	2050	3 1/2 x 5 1/2	34x4 1/2	31x5k	D	Diamond T.....EL	5	4325	3 1/2 x 5 1/2	36x6	40x6d	W	Huffman.....C	1 1/2-2	1695	3 1/2 x 5 1/2	36x4	36x7	W
Autocar.....27H	2	2950	4 x 5 1/2	34x5	36x7	D	Diamond T.....S	5	4500	3 1/2 x 5 1/2	36x6	40x6d	W	Huffman.....D	2-3	2895	3 1/2 x 5 1/2	36x4	36x7	W
Autocar.....27K2	2	3075	4 x 5 1/2	34x5	36x7k	D	Diehl.....A	1	.....	3 1/2 x 5	34x4 1/2	35x5	B	Hurlburt.....A	1 1/2	2850	4 x 5 1/2	34x4	34x5	W
Autocar.....26V	5	3950	3 1/2 x 5 1/2	34x6	36x12	D	Diehl.....B	1 1/2	.....	3 1/2 x 5	36x6	36x7	C	Hurlburt.....B	2 1/2	3750	3 1/2 x 5 1/2	36x4	36x4d	W
Autocar.....26-B	5	4100	3 1/2 x 5 1/2	34x6	36x12	D	Diehl.....C	1 1/2	.....	3 1/2 x 5	36x6	36x7	C	Hurlburt.....C	3 1/2	4590	3 1/2 x 5 1/2	36x5	36x5d	W
Available.....H1 1/2	1 1/2	2475	1 x 5	36x3 1/2	36x5k	W	Doane.....2 1/2	2 1/2	4100b	3 1/2 x 5 1/2	36x5	36x5d	C	Hurlburt.....D	5	5500	3 1/2 x 5 1/2	36x5	40x6d	W
Available.....H2	2	2775	1 x 5	36x3 1/2	36x5k	W	Doane.....3 1/2	3 1/2	5100b	3 1/2 x 5 1/2	36x5	36x5d	C	Indep'd't(Iowa)	1	1665	3 1/2 x 5	34x3 1/2	34x4	W
Available.....H2 1/2	2 1/2	3167	1 x 5	36x4	36x8k	W	Doane.....6	6	6000b	5 x 6 1/2	36x6	40x6d	C	Indep'd't(Ia.)	1 1/2	2040	3 1/2 x 5 1/2	34x3 1/2	34x5	W
Available.....H3	3	4175	1 1/2 x 5 1/2	36x5	40x5d	W	Dodge Brothers.....K-4	1-2 1/2	3400	3 1/2 x 5 1/2	36x6	36x7	W	Indep'd't(Ia.)	2 1/2	2940	3 1/2 x 5 1/2	36x4	36x4	W
Available.....H5	5	5375	5 x 6	36x6	40x12	W	Dodge Brothers.....K-7	3 1/2	4400	3 1/2 x 5 1/2	36x6	36x7	W	Indep'd't(Ohio)	1	2385	3 1/2 x 5	36x3 1/2	36x5	W
Available.....H5 1/2	5 1/2	5775	5 x 6	36x6	40x12	W	Dodge Brothers.....K-10	3 1/2	4850	3 1/2 x 5 1/2	36x6	36x7	W	Indep'd't(Ohio)	2 1/2	3085	3 1/2 x 5 1/2	36x4	36x4d	W
*Avery.....1	1	.....	3 x 1 1/2	31x5m	24x5m	J	Dodge Brothers.....K-11	3 1/2	5000	3 1/2 x 5 1/2	36x6	36x7	W	Indep'd't(Ohio)	3 1/2	3985	3 1/2 x 5 1/2	36x5	36x5d	W
Beck.....A Jr.	1 1/2	1285m	3 1/2 x 5	34x3 1/2	31x4 1/2	W	Dodge Brothers.....K-12	3 1/2	5200	3 1/2 x 5 1/2	36x6	36x7	W	Indiana.....20	1 1/2	.....	3 1/2 x 5	34x3 1/2	34x5k	W
Beck.....B-30	1 1/2	1725	3 1/2 x 5	34x5	36x6	W	Dodge Brothers.....K-13	3 1/2	5400	3 1/2 x 5 1/2	36x6	36x7	W	Indiana.....12	1 1/2	.....	3 1/2 x 5	36x4k	36x7k	W
Beck.....C-40	2	1810	3 1/2 x 5	36x6	36x6	W	Dodge Brothers.....K-14	3 1/2	5600	3 1/2 x 5 1/2	36x6	36x7	W	Indiana.....25	2 1/2	.....	3 1/2 x 5	36x4k	36x8k	W
Beck.....D-50	2 1/2	2395	3 1/2 x 5 1/2	36x7	40x8	W	Dodge Brothers.....K-15	3 1/2	5800	3 1/2 x 5 1/2	36x6	36x7	W	Indiana.....35	3 1/2	.....	3 1/2 x 5	36x5k	36x5dk	W
*Bell.....(Penn.)	1 1/2	1000b	3 1/2 x 5	31x4m	31x4m	B	Dodge Brothers.....K-16	3 1/2	6000	3 1/2 x 5 1/2	36x6	36x7	W	Indiana.....51	5 1/2	.....	3 1/2 x 5	36x6k	40x6dk	W
Bell.....M(Iowa)	1	1495	3 1/2 x 5	35x5	35x5m	W	Dodge Brothers.....K-17	3 1/2	6200	3 1/2 x 5 1/2	36x6	36x7	W	International.....S	1	1250	3 1/2 x 5	34x5m	34x5m	W
Bell.....E(Iowa)	1 1/2	2100	3 1/2 x 5 1/2	34x3 1/2	31x5	W	Dodge Brothers.....K-18	3 1/2	6400	3 1/2 x 5 1/2	36x6	36x7	W	International.....21	1 1/2	1650				

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Koehler.....F	3 1/2	\$4470	4 1/2 x 5 1/2	36x5	36x10	W	*Oldsmobile Econ	1	\$1095	3 1/2 x 5 1/2	35x5n	35x5n	J	Signal.....NF	1	\$1950	3 1/2 x 5	34x5n	36x6n	W
Koehler, MT. Trac	5	3375	4 1/2 x 5 1/2	36x4	36x7	W	Olympic.....A	2 1/2	3200	4 1/2 x 5 1/2	36x4	36x8	W	Signal.....H	1 1/2	2450	4 1/2 x 5 1/2	34x4	36x6	W
Krebs.....23	3 1/2	1280	3 1/2 x 5	34x4 1/2	34x4 1/2	B	Onida.....B9	1 1/2	2825	4 1/2 x 5 1/2	36x3 1/2	36x7	W	Signal.....J	2 1/2	2875	4 1/2 x 5 1/2	34x4	36x8	W
Krebs.....24	1 1/2	1565	3 1/2 x 5	34x5	34x5	W	Onida.....C9	2 1/2	3700	4 1/2 x 5 1/2	36x4	36x8	W	Signal.....M	3 1/2	3675	4 1/2 x 5 1/2	36x5	40x5 1/2	W
Krebs.....45	1 1/2	2125	4 1/2 x 5 1/2	36x4	36x7	W	Onida.....D9	3 1/2	4050	4 1/2 x 5 1/2	36x5	36x10	W	Signal.....R	5	4400	4 1/2 x 6	36x6	40x6 1/2	W
Krebs.....75	2 1/2	2375	4 1/2 x 5 1/2	36x4	36x8	W	Oshkosh.....E9	5	4725	4 1/2 x 5 1/2	36x6	40x12	W	Southern.....10	1	2090	3 1/2 x 5	34x3 1/2	34x4	W
Krebs.....110	3 1/2	2975	4 1/2 x 5 1/2	36x5	40x10	W	Oshkosh.....A	2	3250	3 1/2 x 5	36x6n	36x6n	B	Southern.....15	1 1/2	2590	3 1/2 x 5 1/2	36x6n	34x4	W
Larrabee.....X-2	1	1925	3 1/2 x 4 1/2	34x5n	34x5n	D	Oshkosh.....AA	2	3400	3 1/2 x 5	36x6n	36x6n	B	Southern.....20	2	2990	3 1/2 x 5 1/2	36x6n	40x8 1/2	W
Larrabee.....U	1 1/2	2100	3 1/2 x 5	34x3 1/2	34x5	W	Oshkosh.....B	2 1/2	3850	4 1/2 x 5 1/2	38x7n	38x7n	B	*Standard.....75	1 1/2	1330	3 1/2 x 5 1/2	33x5n	33x5n	W
Larrabee.....19-21	2 1/2	2400	3 1/2 x 5	34x3 1/2	34x5 1/2	W	Oshkosh.....BB	2 1/2	4000	4 1/2 x 5 1/2	38x7n	38x7n	B	Standard.....1-K	1 1/2	1600	3 1/2 x 5	34x3 1/2	34x5 1/2	W
Larrabee.....K	2 1/2	3100	3 1/2 x 5	36x4	36x7	W	*Overland.....4	3/8	450	3 1/2 x 4	30x3 1/2	30x3 1/2	B	Standard.....76	2 1/2	2400	4 1/2 x 5 1/2	36x4 1/2	36x7 1/2	W
Larrabee.....K-5	2 1/2	3450	4 1/2 x 5 1/2	36x4	36x8	W	Packard.....EC	2-3	3100	4 1/2 x 5 1/2	36x4	36x7	W	Standard.....66	3 1/2	3150	4 1/2 x 5 1/2	36x5	36x10	W
Larrabee.....L-4	3 1/2	4000	4 1/2 x 5 1/2	36x5	36x5 1/2	W	Packard.....EX	2-3 1/2	3100	4 1/2 x 5 1/2	36x6n	40x8n	W	Standard.....5-K	5-7	4400	4 1/2 x 6	36x6	40x12	W
Larrabee.....W	5-7	4800	4 1/2 x 6	36x6	40x6 1/2	W	Packard.....ED	3-4 1/2	4100	4 1/2 x 5 1/2	36x5	36x5 1/2	W	*Star.....1 1/2	1 1/2	610b	3 1/2 x 4 1/2	30x3 1/2	30x3 1/2	B
Maccar.....L	1 1/2	.....	4 1/2 x 5 1/2	36x4	36x6	W	Packard.....EF	5-7 1/2	4500	5 1/2 x 5 1/2	36x6	40x6 1/2	W	Sterling.....1 1/2	1 1/2	2885	4 1/2 x 5 1/2	36x4 1/2	36x5 1/2	W
Maccar.....H-A	2	.....	4 1/2 x 5 1/2	36x4	36x6 1/2	W	Paige.....52-19	1 1/2	1950	4 1/2 x 5 1/2	34x3 1/2	34x5	W	Sterling.....2 1/2	2 1/2	3055	4 1/2 x 5 1/2	36x4 1/2	36x5 1/2	W
Maccar.....H-2	3	.....	4 1/2 x 5 1/2	36x4	36x6 1/2	W	Paige.....54-20	2 1/2	2420	4 1/2 x 5 1/2	34x4	34x8	W	Sterling.....3 1/2	3 1/2	3290	4 1/2 x 5 1/2	36x4 1/2	36x5 1/2	W
Maccar.....M-3	4	.....	4 1/2 x 5 1/2	36x5	36x6 1/2	W	Paige.....51-18	3 1/2	3145	4 1/2 x 5 1/2	36x5	36x5 1/2	W	Sterling.....5-W	5	4950	5 1/2 x 6 1/2	36x6	40x6 1/2	C
Maccar.....G	5-6	.....	4 1/2 x 6	36x5	40x6 1/2	W	Parker.....C-22	1	1875	3 1/2 x 5 1/2	34x5n	34x5n	W	Sterling.....5-C	5	5500	5 1/2 x 6	36x6	40x6 1/2	C
MacDonald.....A	7 1/2	5750	1 1/2 x 10	10x7	40x14	J	Parker.....G-22	2 1/2	3200	4 1/2 x 6	34x4	34x4 1/2	W	Sterling.....7 1/2	7 1/2	6000	5 1/2 x 6 1/2	36x6	40x7 1/2	C
Mack.....AB D.R.	1 1/2	3150	1 1/2 x 5	36x4	36x3 1/2	D	Parker.....J-20	3 1/2	3950	4 1/2 x 6	36x5	40x5 1/2	W	*Stewart.....14	14	1245	3 1/2 x 5 1/2	34x4 1/2	34x4 1/2	I
Mack.....AB Chain	1 1/2	3000	4 1/2 x 5	36x4	36x3 1/2	C	Parker.....M-20	5	4850	5 1/2 x 6	36x6	40x6 1/2	W	Stewart.....15	15	1445	3 1/2 x 5 1/2	35x5n	35x5n	I
Mack.....AB D.R.	2 1/2	3300	4 1/2 x 5	36x4	36x4 1/2	D	Patriot.....Reverse	1	1380	3 1/2 x 5	35x5n	35x5n	W	Stewart.....9	9	1790	3 1/2 x 5	34x3 1/2	34x5	I
Mack.....AB Chain	2 1/2	3750	4 1/2 x 5	36x4	36x4 1/2	D	Patriot.....Lincoln	2	2050	4 1/2 x 5 1/2	34x3 1/2	34x5	W	Stewart.....7-X	2 1/2	2300	4 1/2 x 5 1/2	36x5	36x5 1/2	I
Mack.....AB D.R.	2 1/2	3850	4 1/2 x 5	36x4	36x4 1/2	D	Patriot.....Wash'n	2	2900	4 1/2 x 5 1/2	36x4	36x7	W	Stewart.....10	10	3100	4 1/2 x 5 1/2	36x5	36x5 1/2	I
Mack.....AC Chain	3 1/2	4950	5 1/2 x 6	36x5	40x5 1/2	C	Pierce-Arrow.....1	3 1/2	3200	4 1/2 x 5 1/2	36x4	36x4 1/2	W	Stewart.....10-X	10	3190	4 1/2 x 5 1/2	36x5	36x5 1/2	I
Mack.....AC Chain	5	5500	5 1/2 x 6	36x6	40x6 1/2	C	Pierce-Arrow.....5	5	4850	4 1/2 x 5 1/2	36x5	40x6 1/2	W	*Stoughton.....C	3 1/2	1245	4 1/2 x 5 1/2	34x4 1/2	34x4 1/2	W
Mack.....AC Chain	6 1/2	5750	5 1/2 x 6	36x6	40x6 1/2	C	Pierce-Arrow.....5	5	4850	4 1/2 x 5 1/2	36x5	40x6 1/2	W	Stoughton.....A	1	1790	3 1/2 x 5 1/2	34x5	34x5	W
Mack.....AC Chain	7 1/2	6000	5 1/2 x 6	36x7	40x7 1/2	C	Pittsburgher.....1 1/2-2	1 1/2	3000	3 1/2 x 5	36x4	36x6	W	Stoughton.....B	1 1/2	2150	3 1/2 x 5 1/2	36x5 1/2	36x5	W
Mack Trac.....AB	5	3400	4 1/2 x 5	36x4	36x4 1/2	C	Pittsburgher.....3	3	3800	4 1/2 x 5 1/2	36x5 1/2	36x8	W	Stoughton.....D	2	2490	4 1/2 x 5 1/2	36x5 1/2	36x7 1/2	W
Mack Trac.....AC	7	4950	5 1/2 x 6	36x5	40x5 1/2	C	Power.....F	2	3150	3 1/2 x 5 1/2	36x5	36x7	W	Stoughton.....E	3	3150	4 1/2 x 5 1/2	36x5 1/2	36x7 1/2	W
Mack Trac.....AC	10	5500	5 1/2 x 6	36x6	40x6 1/2	C	Power.....C	3 1/2	4250	4 1/2 x 5 1/2	36x5	40x10	W	Sullivan.....F	2	2800	4 1/2 x 5 1/2	36x4 1/2	36x7 1/2	W
Mack Trac.....AC	13	5750	5 1/2 x 6	36x6	40x12	C	Rainier.....R-21	3 1/2	.....	3 1/2 x 5	35x5n	35x5n	W	Sullivan.....H	3 1/2	3750	4 1/2 x 6	36x5	36x5 1/2	W
Mack Trac.....AC	15	6020	5 1/2 x 6	36x7	40x12 1/2	C	Rainier.....R-29	1 1/2	.....	3 1/2 x 5	34x3 1/2	34x4	W	*Thomast.....1 1/2	1 1/2	1705a	4 1/2 x 5 1/2	34x5	34x5	C
*Mapleleaf.....**	1 1/2	3000	3 1/2 x 5 1/2	34x5n	36x6n	W	Rainier.....R-26	1 1/2	.....	3 1/2 x 5	34x3 1/2	34x5	W	Tiffin.....GW	1 1/2	2100	4 1/2 x 5 1/2	36x3 1/2	36x5	W
Mapleleaf.....AA**	2	3800	4 1/2 x 5 1/2	36x4	36x7	W	Rainier.....R-28	2 1/2	.....	3 1/2 x 5	34x4	34x6	W	Tiffin.....MW	2 1/2	2700	4 1/2 x 5 1/2	36x4	36x3 1/2	W
Mapleleaf.....BB**	3	4050	4 1/2 x 5 1/2	36x4	36x7 1/2	W	Rainier.....R-20	2 1/2	.....	3 1/2 x 5	34x4	34x6	W	Tiffin.....PW	3 1/2	3600	4 1/2 x 5 1/2	36x5	40x5 1/2	W
Mapleleaf.....CC**	4	4800	4 1/2 x 5 1/2	36x5	36x5 1/2	W	Rainier.....R-15	3 1/2	.....	3 1/2 x 5	36x5	36x5 1/2	W	Tiffin.....F50	5	4300	4 1/2 x 6	36x6	40x6 1/2	W
Mapleleaf.....DD**	5	5625	4 1/2 x 5 1/2	36x6	40x6 1/2	W	Rainier.....R-17	5-6	.....	3 1/2 x 5	36x6	40x6 1/2	W	Tiffin.....F60	6	4500	4 1/2 x 6	36x6	40x12	W
Master.....JW	1 1/2	2290	4 1/2 x 5 1/2	34x3 1/2	34x5	W	Ranger.....TK-20-2	1 1/2	2450	3 1/2 x 5	36x6n	38x7n	W	Titan.....2	2	2750	4 1/2 x 5	36x4 1/2	36x7 1/2	D
Master.....JD	1 1/2	2590	4 1/2 x 5 1/2	34x3 1/2	34x5	D	*Res.....F	1 1/2	1245	3 1/2 x 5	34x4 1/2	34x4 1/2	W	Titan.....5	5	3950	4 1/2 x 6	36x5	40x12	D
Master.....Z	2	2290	4 1/2 x 5 1/2	34x3 1/2	34x5	W	Reliance.....10A	1 1/2	2100	4 1/2 x 5 1/2	36x3 1/2	36x5	I	Titan.....11	11	2000a	4 1/2 x 5 1/2	36x5n	38x7n	W
Master.....W	2 1/2	2380	4 1/2 x 5 1/2	34x4	36x7	D	Reliance.....20B	2 1/2	3100	4 1/2 x 5 1/2	36x4	36x4 1/2	I	Titan.....15	15	2475a	4 1/2 x 5 1/2	36x4	36x7	W
Master.....DD	2 1/2	3190	4 1/2 x 5 1/2	34x4	36x7	D	Republic.....75	3 1/2	1395b	3 1/2 x 5	32x4 1/2	32x4 1/2	W	Tower.....J	1 1/2	2475a	4 1/2 x 5 1/2	36x4	36x7	W
Master.....A	3 1/2	3900	4 1/2 x 5 1/2	36x5	40x5 1/2	W	Republic.....10	1	1695	3 1/2 x 5	35x5n	34x5n	W	Tower.....C	3 1/2	3475a	4 1/2 x 5 1/2	36x5	36x5 1/2	W
Master.....E	3 1/2	4290	4 1/2 x 5 1/2	36x5	40x5 1/2	W	Republic.....11 1/2	1 1/2	1795	3 1/2 x 5	34x3 1/2	34x6	I	Traffic.....C	2	1595	3 1/2 x 5	34x3 1/2	34x6 1/2	I
Master.....Y	4	4400	4 1/2 x 5 1/2	36x6	40x6 1/2	D	Republic.....19	1 1/2	2195	4 1/2 x 5 1/2	36x4									

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive
				Front Rear						Front Rear						Front Rear	
Walker-Johnson A	3	\$2250	3 1/2 x 5	34x3 1/2 34x5	W	Wichita M	2	\$2400	3 1/2 x 5 1/2	36x3 1/2 36x5	W	Wiscox F	5	\$4350	4 1/2 x 6 1/2	36x5 36x6 1/2	W
Walker-Johnson B	3	2750	4 1/2 x 5 1/2	36x4 36x5	W	Wichita RX	3	3200	4 1/2 x 5 1/2	36x4 36x5	W	Wiscox F	1 1/2	2270	3 1/2 x 5	36x3 1/2 36x5	W
Walker S	5	4850	4 1/2 x 6 1/2	36x6 40x6 1/2	W	Wichita O	4	3500	4 1/2 x 6 1/2	36x5 36x6 1/2	W	Wiscox EA	1 1/2	2825	4 1/2 x 5 1/2	36x4 36x7	W
Watson C	1	1485	3 1/2 x 5 1/2	35x5 35x6 1/2	W	Wiscox AA	1	1900	4 1/2 x 5 1/2	36x4 36x5	W	Wiscox C	3 1/2	3685	4 1/2 x 5 1/2	36x5 36x7	W
Watson N	3 1/2	4250	4 1/2 x 5 1/2	36x5 36x10	W	Wiscox BB	1 1/2	2550	4 1/2 x 5	36x4 36x5	W	Wiscox H	6	4520	4 1/2 x 6	36x6 40x6	W
Western W1	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2 36x5 1/2	W	Wiscox D	2 1/2	3000	4 1/2 x 5	36x4 36x5 1/2	W	Wiscox A	1	1750	3 1/2 x 5	34x5 34x5 1/2	W
Western W2	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2 36x5 1/2	W	Wiscox E	3 1/2	3950	4 1/2 x 6	36x5 36x5 1/2	W	Wiscox B	1 1/2	2100	3 1/2 x 5	35x5 36x6	W
Western W3	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2 36x5 1/2	W							Wiscox C	2	2700	4 1/2 x 5 1/2	36x6 36x7	W
Western W4	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2 36x5 1/2	W							Wiscox D	5	3500	4 1/2 x 6 1/2	36x6 36x10	W
Western W5	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2 36x5 1/2	W							Wiscox E	7	4000	5 x 6 1/2	36x6 36x12	W
White 15	2	2100	3 1/2 x 5 1/2	34x5 34x5 1/2	B							Witt-Wil N	1 1/2	2450	3 1/2 x 5 1/2	36x3 1/2 36x5 1/2	W
White 20	2	2100	3 1/2 x 5 1/2	34x5 34x5 1/2	B							Witt-Wil P	2 1/2	2900	4 1/2 x 5 1/2	36x3 1/2 36x5 1/2	W
White 30	3 1/2	4200	3 1/2 x 5 1/2	36x5 40x5 1/2	D							Wolverine J	1	2125	3 1/2 x 5	34x3 34x4	I
White 40	4 1/2	4500	3 1/2 x 5 1/2	36x6 40x6 1/2	D							Wolverine J	1 1/2	2375	3 1/2 x 5	34x3 34x5	I
White 45	5	4500	3 1/2 x 5 1/2	36x6 40x6 1/2	D							Wolverine J	2	2640	3 1/2 x 5	34x3 34x7	I
White Hick E	1 1/2	1225	3 1/2 x 5	34x5 34x5 1/2	W							Wolverine J	2 1/2	3425	4 1/2 x 5 1/2	36x5 36x10	I
White Hick H	1 1/2	1375	3 1/2 x 5	36x3 1/2 36x5	W							Wolverine L	3 1/2	4100	4 1/2 x 5 1/2	36x5 36x10	I
White Hick K	2 1/2	1675	4 1/2 x 5 1/2	36x4 36x5	W												
Wichita K	1	1875	3 1/2 x 5 1/2	36x3 1/2 36x5	W												

FINAL DRIVE:—B—Bevel, C—Chain, D—Double Reduction, I—Internal Gear, W—Worm.
 r—6 cyl. s—6 cyl. t—2 cyl.—all others are 4 cyl. d—dual tires. k—pneumatic tires optional at extra cost. n—pneumatic tires. a—price includes several items of equipment. b—price includes body. *—express truck or delivery wagon. **—Canadian Make. trac—tractor.

Specifications of Current Farm Tractor Models

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders, Bore, Stroke	Fuel	Plow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders, Bore, Stroke	Fuel	Plow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders, Bore, Stroke	Fuel	Plow Capacity		
Allis-Chal. G.P.	6-12	\$250	2	Leit.	4-3 1/2 x 4 1/2	Gas.	1	Fordson	18-30	\$395	4	Own	4-4 x 5	G, K	2	Oldsmar GarK	2 1/2-5	\$225	4	Own	1-5 1/2 x 5 1/2	Gas.	1		
Allis-Chalm.	15-25	1185	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Franklin	18-30	4000	2	Clim.	4-5 x 6 1/2	G or K	3-4	Peoria	12-25	1600	4	Clim.	4-5 x 6 1/2	G, K	3		
Allis-Chalm.	20-35	1885	4	Own	4-4 1/2 x 6 1/2	G or K	3-4	Franklin	18-30	3350	2	Clim.	4-5 x 6 1/2	G or K	3-4	Pioneer	18-36	1750	4	Own	4-5 1/2 x 6	G, K, D	4		
Allis-Chalm.	20-35	2085	4	Own	4-4 1/2 x 6 1/2	G	4	Franklin	18-30	4350	2	Clim.	4-5 x 6 1/2	G or K	3-4	Pioneer	40-75	3550	4	Own	4-7 x 8	Gas.	10		
Allwork 2-G	14-28	1695	4	Own	4-4 1/2 x 6	G or K	3	Frisk	12-20	....	4	Erd.	4-4 x 6	G, K	2-3	Plowman	15-30	1295	4	Buda	4-4 1/2 x 6	G, K	3-4	
Allwork C	14-28	1395	4	Own	4-5 x 6	G or K	3	Frisk	15-28	....	4	Beav.	4-4 1/2 x 6	G, K	3-4									
ARO 1921-22	3-6	385	4	Own	1-4 1/2 x 5	Gas.	1																		
Aultman-T.	15-30	1930	4	Clim.	4-5 x 6 1/2	G, K	4	Grain Belt A	18-30	2150	4	Wauk	4-4 1/2 x 6 1/2	G or K	4	Reliable	10-20	390	4	Own	2-6 x 7	Ker.	2		
Aultman-T.	22-45	2830	4	Own	4-5 1/2 x 8	G, K	6	Gray	20	1975	3	Wauk	4-4 1/2 x 6 1/2	Gas.	4	Rex	12-25	1600	4	Wauk	4-4 1/2 x 6 1/2	G or K	3		
Aultman-T.	30-60	4090	4	Own	4-7 x 9	G, K, D	8-10	Gray	44	2165	3	Wauk	4-5 x 6 1/2	Gas.	4-5	Russell	12-24	1500	4	Own	4-4 1/2 x 6 1/2	G or K	2-3		
Automot. B-3	12-21	1250	4	Herc.	4-4 x 5 1/2	Gas.	2-3	Gt. Western St	20-30	1950	4	Beav.	4-4 1/2 x 6	K	4	Russell	15-30	2200	4	Own	4-5 x 6 1/2	G or K	3-4		
Avery, SR, Cul	5-10	....	4	Own	4-3 x 4	G, K	....																	
Avery Cult-C	5-10	....	4	Own	4-3 x 4	G, K	2																	
Avery C	5-10	....	4	Own	4-3 x 4	G, K	2	Hart-Parr 20	20	765	4	Own	2-5 1/2 x 6 1/2	K, D.	2	Samson M	10-20	445	4	Own	4-4 x 5 1/2	G, K	2	
Avery C	8-16	....	4	Own	2-5 1/2 x 6	G, K, D	2-3	Hart-Parr 30	30	895	4	Own	2-6 1/2 x 7	K, D.	3	Sandusky J	10-20	1250	4	Own	4-4 x 5 1/2	G, K, D	2	
Avery C	12-20	....	4	Own	4-4 1/2 x 6	G, K, D	3-4	Heider D	9-16	870	4	Wauk	4-4 1/2 x 6 1/2	G, K	2	Sandusky E	15-35	1750	4	Own	4-5 x 6 1/2	G, K, D	4	
Avery C	12-25	....	4	Own	4-4 1/2 x 6	G, K, D	3	Heider C	12-20	995	4	Wauk	4-4 1/2 x 6 1/2	G, K	3	Shelby D	15-30	....	4	Beav.	4-4 1/2 x 6	G, K	3
Avery C	12-25	....	4	Own	2-6 1/2 x 7	G, K, D	3-4	Heider Cult	5-10	800	4	Leit.	4-3 1/2 x 5 1/2	Gas.	1	Shelby C	9-18	....	4	Wauk	4-3 1/2 x 5 1/2	G or K	2
Avery C	14-28	....	4	Own	4-4 1/2 x 6	G, K, D	3-4	Huber Light 4	12-25	985	4	Wauk	4-4 1/2 x 6 1/2	G or K	3	Steady Pull	12-24	1485	4	Own	4-4 x 5	Gas.	3	
Avery C	18-36	....	4	Own	4-5 1/2 x 6	G, K, D	4-5	Huber Super 4	15-30	1885	4	Midw.	4-4 1/2 x 6	Gas.	3									
Avery C	25-50	....	4	Own	4-6 1/2 x 7	G, K, D	5-6																	
Avery C	45-65	....	4	Own	4-7 1/2 x 8	G, K, D	8-10																	
Bates Mule H	15-25	....	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Illinois C	15-30	....	4	Clim.	4-5 x 6 1/2	G, K	4	Tioga	19-32	....	4	Wisc.	4-4 1/2 x 6	Gas.	2-4
Bates Mule F	18-25	....	2	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Indiana F	5-10	665	2	Leit.	4-3 1/2 x 4 1/2	Gas.	1-2	Toro Cultivator	6-10	750	3	Leit.	4-3 1/2 x 4 1/2	Gas.	2	
Bates Mule G	25-35	....	2	Midw.	4-4 1/2 x 6	Gas.	....	International	8-16	1670	4	Own	4-4 1/2 x 5	G, K, D	2	Toro Tractor 22	10-20	495	3	Leit.	4-3 1/2 x 4 1/2	Gas.	2
Beeman	2-4	240	4	Own	1-3 1/2 x 4 1/2	Gas.	....	Internat. Titan	10-20	1780	4	Own	2-6 1/2 x 8	G, K, D	2	Townsend	15-30	1350	2	Own	4-6 1/2 x 7	Ker.	2-3	
Best	18-30	3100	2	Own	4-4 1/2 x 6 1/2	G, K, D	4	Int. Titan	15-30	1750	4	Own	4-5 1/2 x 8	G, K, D	4	Townsend	25-50	2500	2	Own	4-7 x 8	Ker.	3-4		
Best	60	5450	2	Own	4-6 1/2 x 8 1/2	G, K, D	8-9	J-T	20-40	....	2	Clim.	4-5 x 6 1/2	G, K, D	3-4	Townsend	40-80	....	4	....	4-8 1/2 x 10	Ker.	4-8
Boring	5-10	395	4	Leit.	4-3 1/2 x 4 1/2	G	....	Kinkade Garden	1 1/2	190	1	Own	1-3 x 3	Gas.	....	Traction Motor	40-50	....	4	....	8-3 1/2 x 5	Gas.	4-5
Boring 1921	1850	3	Wauk	4-4 1/2 x 5 1/2	G or K	2	....	La Crosse	12-24	985	2	Own	2-6 x 7	G, K	3	Traylor TB	0-12	500	4	Leit.	4-3 1/2 x 4 1/2	Gas.	1-2	
Burn-Oil 1922	15-30	1395	4	Own	2-6 1/2 x 7	Ker.	3-4	Lauson	12-25	1295	4	Midw.	4-4 1/2 x 6 1/2	Gas.	3	Trundaar 10	25-40	3750	2	Wauk	4-5 x 6 1/2	G or K	4		
								Lauson 5	12-25	1295	4	Midw.	4-4 1/2 x 6 1/2	Gas.	3	Twin City	12-20	1200	4	Own	4-4 1/2 x 6	G, K	3		
Capital	15-30	1000	2	Own	4-4 1/2 x 6	Gas.	3	Lauson 21	15-30	1675	4	Beav.	4-4 1/2 x 6	G or K	3-4	Twin City	20-35	2750	4	Own	4-5 1/2 x 6 1/2	G, K	5-6		
Case	12-20	1050	4	Own	4-4 1/2 x 5	G, K, D	3	Lauson Road	15-30	2080	4	Beav.	4-4 1/2 x 6	K	....	Uncle Sam C20	12-20	1295	4	Weid.	4-4 x 5 1/2	G	2-3	
Case	12-20	....	4	Own	4-4 1/2 x 5	G	2	Leader B	12-18	685	4	Own	2-6 x 7	G, K, D	2-3	Uncle Sam B19	20-30	1885	4	Beav.	4-4 1/2 x 6	G or K	3-4	
Case	15-27	1320	4	Own	4-4 1/2 x 6	G or K	3-4	Leader N	16-32	1725	4	Clim.	4-5 x 6 1/2	G, K	3-4	Uncle Sam D21	20-30	1895	4	Beav.	4-4 1/2 x 6	G or K	3-4		
Case	22-40	2550	4	Own	4-5 1/2 x 6 1/2	G or K	4-5	Leader GU	18-35	2150	2	Clim.	4-5 x 6 1/2	G, K	3-4	Utilitor 501	2 1/2-4	295	4	Own	1-3 1/2 x 4 1/2	G	1		
Case	40-72	5200	4	Own	7 x 8	G, K, D	8-10	Leader H	40	4500	....	Cont.	4-4 1/2 x 6 1/2	Gas.	4	Utilitor 501A	2 1/2-4	340	4	Own	1-3 1/2 x 4 1/2	G	1	
Caterpillar ST	25	....	2	Own	4-4 1/2 x 6	Gas.	4	Linn H4J	40	5000	....	Wauk	4-5 x 6 1/2	Gas.	4	Wallis K	15-25	1995	4	Own	4-4 1/2 x 6 1/2	G, K	3
Caterpillar 10T	40	....	2	Own	4-6 1/2 x 7	Gas.	6	Little Giant B	16-22	2200	4	Own	4-4 1/2 x 6	K	4	Waterloo N	12-25	675	4	Own	2-6 1/2 x 7	Ker.	3	
Caterpillar T35	15-25	....	2	Own	4-4 x 5 1/2	Gas.	3	Little Giant A	26-35	3300	4		1-5 1/2 x 6	K	....	Wetmore 21-22	12-25	1185	4	Wauk	4-4 x 5 1/2	G, K	3
Centaur	5-2 1/2	345	2	N Way	2-4 1/2 x 4 1/2	G or K	1	Lombard 1922	85-150	8950	2	Wisc.	6-5 1/2 x 6 1/2	Gas.	16	Whitney D	0-18	595	4	Own	2-5 1/2 x 6 1/2	G, K, D	3-4		
Chicagoc	40	2500	4	Own	4-4 1/2 x 6	Gas.	4	Lombard 1922	50	5300	2	Wisc.	4-4 1/2 x 6 1/2	Gas.	6-10	Wichita	15-30	2000	4	Beav.	4-4 1/2 x 6	G, K, D	3-4		
Cietrac	F	9-16	595	2	Own	4-3 1/2 x 4 1/2	G, K, D	2								Wisconsin E	10-30	1850	4	Own	4-5 x 6 1/2	G or K	3		
Cietrac	W	12-20	1345	2	Own	4-4 x 5 1/2	G, K, D	2-3								Wisconsin F	20-40	2050	4	Wauk	4-5 x 6 1/2	G or K	4		
								Merry Gar 1922	2	210	2	Evin	1-2 1/2 x 3 1/2	Gas.	....	Wisconsin H	12-40	2550	4	Clim.	4-5 1/2 x 7	G or K	4-6	
Dakota	4	15-27	1500	3	Dom.	4-4 1/2 x 6	Gas.	3	Minne. All-P	12-25	800	4	Own	4-4 1/2 x 7	G or K	3	Yuba	12-20	2400	2	Wisc.	4-4 1/2 x 6 1/2	G, K, D	3	
Depue	A	20-30	2500	4	Buda	4-4 1/2 x 6	Gas.	4	Minne. Gen-P	17-30	1600	4	Own	4-4 1/2 x 7	G or K	3-4	Yuba	15-25	2750	2	Wisc.	4-4 1/2 x 6	G, K, D	
Dill	D	20	2380	4	Cont.	4-4 1/2 x 5 1/2	Gas.	3	Minne. Med-D	22-44	2650	4	Own	4-6 x 7	G or K	5-6	Yuba	23-35	3900	2	Wisc.	4-5 1/2 x 7	G, K, D	4	
Dill	R. W.	20	2980	4	Midw.	4-4 1/2 x 6	Gas.	3	Minne. Heavy-D	35-70	3850	4	Own	4-7 1/2 x 9	G or K	8-9	Yuba	25-40	4250	2	Wisc.	4-5 1/2 x 7	G, K, D	
Do-it-All	A	3-6	495	Own	1-4 1/2 x 5	Gas.	1	Mohawk 1922	8-16	650	2	Light	4-3 1/2 x 6 1/2	K or G	1-2	Yuba	4750	2	Yuba	4-5 1/2 x 7	D	
								Moline Univ D	9-18	2	Own	4-3 1/2 x 5	Gas.	2-3										
								Moline Orch.	9-18	2	Own	4-3 1/2 x 5	Gas.	2-3										
								Motoc Macult.	1 1/2	105	2	Own	1-2 1/2 x 3 1/2	Gas.	....	Zelle	12-25	....	4	Buda	4-4 1/2 x 5 1/2	G or K	3
Eagle	F	12-22	4	Own	2-7 x 8	G or K	3-4	NB	3-6	425	4	Own	2-3 1/2 x 4	Gas.	1									
Eagle	H	16-30	4	Own	2-8 x 8	G or K	4-5	Nichols-Shep.	20-42	2650	4	Own	8 x 10	G or K	2-6									
E-B	AA	12-20	1095	4	Own	4-4 1/2 x 5	G, K, D	3	Nichols Shep.	25-50	3090	4	Own	8 x 10	G or K	4-7									
								Nilson Senior	20-40	1975	5	Wauk	4-5 x 6 1/2	G, K	4										
Fageol	D	9-18	1525	4	Lve.	4-3 1/2 x 5	Gas.	2	Oil Pull	K	12-20	4	Own	2-6 x 8	K, D	3								
Farm Horse B	18-30	1885	4	Clim.	4-5 x 6 1/2	G, K	4																		
Farquhar	15-25	4	Buda	4-4 1/2 x 6	G, K, D	3-4																		
Farquhar	18-35	4	Own	4-6 x 8	G, K, D	4-5																		
Farquhar	25-50	4	Own	4-7 x 8	G, K, D	6-7																		
Fitch 4 Drive	20-35	1850	4	Clim.	4-5 x 6 1/2	G, K	3-4																		

ABBREVIATIONS: G—Gasoline, K—Kerosene, D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav.—Beaver, Clim.—Climax, Cont.—Continental, Dom.—Domas, Evin.—Evinrude, Herc.—Hercules, Leit.—Lectoy, Midw.—Midwest, Neav.—New Way, Nor.—Northway, T.C.—Twin City, Wauk.—Waukesha, Weid.—Weistley, Wisc.—Wisconsin.

*—Crawler type. All others are wheel type. †Price includes plow. ‡Track Runner. †Industrial Tractor.

Here's the *New* Weed Chain —the WEED DE LUXE!

Patented June 3, 1919, January 24, 1922. Other patents pending



THREE notable improvements which more than double the mileage and make the attaching and locking of the chains very easy and absolutely secure, established the WEED DE LUXE as the greatest advance in tire chains since the Weed was invented, yet *they cost your customers no more than formerly!*

THE REINFORCING LINKS on the main Cross Chain links prevent breaking from excessive strains, *increase traction and more than double the mileage.*

THE TWIN-LOC SIDE CHAIN is absolutely smooth on both sides due to the absence of projecting ends and it is made to withstand excessive strains from any angle.

THE LEVER LOCKING CONNECTING HOOK has distinct advantages which make it the most effective in existence. It draws the side chain together with little effort, locks securely with pressure of your thumb and remains locked under all conditions.

The tension of the chain has nothing to do with the locking. This is a very important point because chains must be attached loose enough to "creep" around freely, otherwise they injure tires, and at low speeds there is practically no tension on the chains.

WEED DE LUXE Chains come packed in bags plainly marked with the size of cord and fabric tires they will fit.

The WEED DE LUXE is the best chain to sell because it is the best chain to use, but we have to consider those who have fixed opinions of their own. Therefore we have the complete line:



Engaging the chain



Drawing it in



Locked

The RID-O-SKID for those who think only of first cost.

The WEED for those who like to buy the kind they have always used.

The WEED DE LUXE for those who want the best because in the long run it is the most economical.

The first public announcement of the WEED DE LUXE will appear in The Saturday Evening Post, July 29th Issue

AMERICAN CHAIN COMPANY, Inc.

BRIDGEPORT, CONNECTICUT

In Canada: DOMINION CHAIN COMPANY, LIMITED, Niagara Falls, Ontario

District Sales Offices: Boston Chicago New York Philadelphia Pittsburgh Portland, Ore. San Francisco



Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan	NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ace.....F-G-B	4-31x5	114	32x4	\$1295	\$1295				\$2295	Lincoln.....	Own.	8-31x5	130	33x5					
Ace.....L-H-S	6-31x5	117	32x4	2260	2260				3680	Lincoln.....	Own.	8-31x5	130	33x5	\$2800	\$2800	\$3800	\$4900	\$1900
Ace.....C	6-31x5	123	33x4	2975	2975				4500	Lincoln.....	Own.	8-31x5	142	34x5	\$7000	7000	10500	11000	
Ambassador.....R	6-31x5	130	33x5	b1995	1850	1925			2695	Maibohm.....	Own.	6-31x4	110	32x4	1395	1395	b1495	2165	2165
American.....C	6-31x5	127	33x4	2195	1850	1795			\$2150	Marmon.....	Own.	6-31x5	130	33x4	3385	b3185	3185	3685	4385
Anderson.....Series 40	6-31x5	120	33x4	2020	2015	3025			3095	Maxwell.....	Own.	4-31x4	109	31x4	885	885		1385	1485
Apperson.....8-21-S	6-31x5	121	32x4	1575	1575	1615			2375	McFarlan.....	Own.	6-41x6	140	33x5	6300	b6300	6300	7500	7500
Auburn.....6-51	6-31x5	121	32x4	n2195						Merced.....Series 5	Own.	4-31x5	132	32x4	3950	b3950	c3950	4850	5250
Auburn.....6-51	6-31x5	121	32x4							Merit.....	Cont.	6-31x5	110	32x4	1895	1895			
Bay State.....	6-31x5	121	32x4	1800	1800				2400	Mitchell.....F-50	Own.	6-31x5	120	32x4	1490	1490	b1690	2050	2275
Beck.....4-32	6-31x5	114	31x4	1005	1005					Mitchell.....F-50	Own.	6-31x5	127	32x4			1600		
Beck.....6-50	6-31x5	124	32x4	1545	1545					Monroe.....1922-S-9	Own.	4-31x4	115	32x3	950	950			
Biddle.....B1 & B5	6-31x5	121	32x4	2950	b2950				3950	Moon.....6-40	Cont.	6-31x5	115	32x4	1785	1785	2285	2785	2785
Brewster.....91	4-4 x5	125	32x4	5000	5000				7000	Moon.....6-58	Cont.	6-31x5	178	32x4					
Buick.....1922-34-35-37	4-31x5	109	31x4	895	935				1295	Nash.....891-96-97	Own.	6-31x5	121	33x4	1360	1390	b1545		
Buick.....1922-44-5-6-7	6-31x5	118	33x4	1365	1395				1885	Nash.....892-94-95	Own.	6-31x5	127	33x4			1540	2090	2390
Buick.....1922-48-50	6-31x5	124	34x4	n1785	n1785	1535			2075	Nash Four.....41-4	Own.	4-31x5	112	33x4	965	985		1485	1645
Cadillac.....61	8-31x5	132	33x5	3100	3150	3150			43875	National.....BB	Own.	6-31x5	130	32x4	a2475	b2475	2375	3725	b3250
Cadillac.....X	8-31x5	122	33x4	1750	1790				2550	Nash.....3C	Cont.	6-31x5	128	32x4	2000	b2100	c2200		3200
Case.....W	6-31x5	120	34x4	2200	2260	2850			3250	Nash.....1D	Bea.	6-31x5	123	32x4	3000	b3100	c3200		5500
Chalmers.....1922	6-31x5	117	32x4	1345	1395	1995			2295	Norwalk.....438-KS	Lyc.	4-31x5	110	32x3		1035			
Chalmers.....1922	6-31x5	123	32x4		1495					Oakland.....6-44	Own.	6-21x4	115	32x4	1120	1145	b1265	1685	1785
Chandler.....Six	6-31x5	123	31x4	1595	1595	2295			2395	Ogden.....6 T De Luxe	Cont.	6-31x5	134	33x5	b3750	3750	3850	4500	4800
Chevrolet.....490	4-31x4	102	30x3	525	525				850	Oldsmobile.....43-A	Own.	4-31x5	115	32x4	1145	1145	b1265	1645	1785
Chevrolet.....FB	4-31x5	110	32x4	975	975				1575	Oldsmobile.....46	Own.	6-21x4	122	33x4	1735	1735		2635	
Cleveland.....41	6-31x5	112	32x4	1175	1195				1550	Oldsmobile.....47	Own.	6-21x4	115	32x4	1595	1595	b1595	2145	2285
Cole.....890	8-31x5	127	33x5	2485	b2485	2485			3185	Overland.....4	Own.	4-31x4	100	30x3	550	550		850	895
Columbia.....Challenger	6-31x5	115	32x4		1195				1995	Packard.....Single-Six	Own.	6-31x5	126	33x4	2485	2485	a2250	3175	3275
Columbia.....De Luxe	6-31x5	115	32x4	1475	1475				2295	Packard.....Single-Six	Own.	6-31x5	133	33x4		a2350	2685		3525
Columbia.....Light Six	6-31x5	115	31x4	905	985				1395	Packard.....Twin Six	Own.	12-3 x5	136	33x5	3850	3850	3850	5240	5400
Comet.....C-53	6-31x5	125	33x4		1085	2085			2985	Paige.....6-44	Own.	6-31x5	119	32x4	1465	1465	a1290	1995	2245
Crawford.....22-6-40	6-31x5	122	32x4	3000	3000				4500	Paige.....6-46	Cont.	6-31x5	131	33x4	a2495	a2245	2195	3100	3185
Daniels.....D-19	8-31x5	132	33x5	a4350	b4350	4350			5250	Paterson.....22-6-52	Cont.	6-31x5	120	32x4		1550	1585	2595	2595
Davis.....71	6-31x5	114	31x4		1295					Pontiac.....56-5-7	Own.	8-31x5	125	33x4		b2790	2790	3500	3700
Davis.....61-67	6-31x5	120	32x4	1595	1595	b1095			2095	Pierce-Arrow.....	Own.	6-4 x5	133	33x5	5250	b5250	5250	6800	7000
Dixie Flyer.....H-S-70	4-31x5	113	32x4	1175	1175	b1295			1595	Pilot.....6-50	H-S.	6-31x5	120	32x4	2050	2000	2050	2950	3000
Dodge Brothers.....	4-31x5	114	32x4	850	880				1280	Premier.....6-D	Own.	6-31x5	126	33x5	3150	b3100	3250	4300	5100
Dodge Brothers.....	4-31x5	114	32x4						1440	Promecar.....6-40-A	Falls.	6-31x4	117	32x4	1095	1095		1750	1825
Dort.....6-80	6-4 x5	132	33x5	b39-0	3960	4960			5750	R & V Knight.....R	Own.	4-31x5	116	32x4		1665		2585	2475
Dort.....19-14	4-31x5	108	31x4	885	885				1315	R & V Knight.....J	Own.	6-31x5	127	33x4	2475	b2475	2475	3015	3105
Driggs.....	4-25x4	104	30x3	1275	1275				1775	Reo Series.....B-T6 & U6	Own.	6-31x5	120	33x4	1505		1595	2335	2435
Duesenberg.....Straight 8	8-31x5	134	33x5	6500	6500	6750			7800	Revo.....C	Dues.	4-41x6	131	32x4	3200	3200	3200		4000
Du Pont.....A	4-31x5	124	32x4	3000	3200				3800	Rickenbacker.....A	Own.	6-31x5	117	32x4		1485		1885	1985
Durant.....A-22	6-31x5	109	31x4	n890	890				1365	Roamer.....6-54-E	Cont.	6-31x5	128	32x4	2850	b2855	2785	3850	3850
Durant.....B-22	6-31x5	123	32x4	1600	1650				2250	Roamer.....4-75-E	Dues.	4-41x6	128	32x4	3965	b3585	b3750		b4650
Earl.....40	4-31x5	112	32x4	1435	1095	9500			b1390	Rolls-Royce.....	Own.	6-41x6	143	33x5		10,900			
Elcar.....K-4	4-31x5	118	33x4	1795	1095	a1095			1345	Saxon.....125	Own.	4-31x5	112	32x4	1105	1195		1795	1795
Elcar.....7-R	6-31x5	118	33x4	1395	1395	a1395			2105	Sayers Six.....DP	Cont.	6-31x4	118	33x4	1695	1695		2795	2795
Elgin.....K-1	6-31x5	118	33x4	1345	1295	b1345			2195	Seneca.....L-2 & O-2	Lyc.	4-31x5	108	30x3	875	875			
Emox.....	4-31x5	108	32x4		1095				1195	Seneca.....50 & 51	Lyc.	4-31x5	112	31x4	1095	1095			
Ford.....T	4-31x4	109	30x3	r319	a348	u285			580	Sperling.....A	Supr.	4-31x5	114	32x4	980	980		1685	1685
Franklin.....8-B	6-31x4	115	32x4	1900	1930	u1750			2550	Standard.....98	Own.	8-31x5	127	34x4	2150	b2500	2500	2700	3200
Gardner.....T-R & G	4-31x5	112	32x4	805	805				1595	Stanley.....	Own.	2-4 x5	130	33x4	2700	2700	2700	3775	3950
Grant.....	6-31x5	116	32x4	1385	1385				1895	Stanwood Six.....	Cont.	6-31x4	118	33x4	1765	1765		2750	
Gray.....	4-31x4	100	30x3		490				760	Star.....	Cont.	4-31x4	102	30x3	r319	a348	u285	580	645
H.C.S.....Series 3	4-31x5	120	32x4	2400	2400				2850	Stearns-Knight.....SKL4	Own.	4-31x5	125	34x4	2250	2250	2450	3150	3450
Halladay.....4	4-31x5	115	32x4	1095	1095				1990	Stearns-Knight.....6	Own.	6-31x5	120	34x4	2700	2700	2850	3350	3700
Halladay.....6	6-31x5	115	32x4	1595	1595				2295	Stephens.....90	Own.	6-31x4	122	33x4	1575	b1595	e1625	2450	2550
Handley-Knight.....	4-41x6	125	32x4			2050			3450	Stevens-Duryea.....E	Own.	6-41x6	138	35x5	7250	b6900	6800	b5600	b8900
Hanson.....30	6-31x4	112	31x4		905					Studebaker.....Light Six	Own.	6-31x5	112	32x4	1045	1045		1375	1750
Hanson Six.....48	6-31x4	121	32x4	1595	1595	1795			b2475	Studebaker.....Special Six	Own.	6-31x5	119	32x4	1425	1475	b1475	2150	2350
Hatfield.....A-42	4-31x5	115	32x4		1315	b1315			1950	Studebaker.....Big Six	Own.	6-31x5	120	33x4		n1885	1785	2500	2700
Haynes.....75	6-31x5	132	34x4	2395	b2395	2395			3395	Stutz.....	Own.	4-41x6	130	32x4	2950	b2990	c2990	3900	4450
Haynes.....55	6-31x5	121	32x4	1615	1595				2295	Templar.....A-445	Own.	4-31x5	118	32x4	2025	2125	b2175	2785	2785
Haynes.....48	12-23x5	122	33x5	2995	3595	2995			3995	Talca.....E-1-2-3	L-S.	4-31x5	117	33x4	1175	1175			
Holmes.....Series 4	6-31x4	120	34x4		b3500	2500			b3300	Vellie.....48	Cont.	6-31x4	115	32x4	1585	1585	b1800	2485	2485
Hudson.....Supr 6	6-31x5	120	34x4		b1645	1695			2570	Vellie.....34	Falls.	6-31x4	112	32x3	1235	1235		1750	2085
Huffman.....	6-31x4	120	32x4	1395	1395				2295	Vellie.....53	Own.	6-31x4	115	32x4	1395	1395		2185	2185
Hupmobile.....Series R	4-31x5	112	32x4	1250	1250				1835	Washington.....C	Cont.	6-31x4	120	32x4		1785			2285
Jackson.....638	6-31x4	121	32x4		1485	b1655			2985	Westcott.....C-48	Cont.	6-31x5	125	32x4			1890		2890
Jewett.....Six	6-31x5	112	31x4	1065	1065				1395	Westcott.....A-44	Cont.	6-31x4	120	32x4		1690	n1690		2690
Jordan.....NIX	6-31x4	120	32x4	1895	1795				2785	Wills Sainte Claire.....A-68	Own.	8-31x4							



These New Fedders Cores are Entirely Different

Shallower—Lighter—More Efficient

FEDDERS
AUTOMOTIVE RADIATORS

For 25 years the name **FEDDERS** has been known in the Automotive Industry as an un-failing guarantee of Quality Production, and Efficient, Satisfactory Service.

The new Fedders shallow cores are not like any other cores you've ever seen.

Instead of having the ribbon soldered at the points (that is, merely on the offset), we have incorporated two or three features in this core whereby we get a notched contact as well as a "V" contact. In dipping the core, the

solder works into the notch and "V" contacts, making a thoroughly rigid radiator.

So high is the heat dissipation per square foot of radiating surface that these shallow cores actually show a greater radiating efficiency than deeper, heavier cores of ordinary construction.

Their High Quality and Fair Price Makes Them Ideal for Replacements

Repair Men and Garage Owners interested in adding a very profitable and satisfactory line of service and equipment

should write us at once. We are appointing Distributors and Dealers in every section of the country.

Fedders Manufacturing Company, Inc.

Factory and General Offices
BUFFALO, N. Y.

Canadian Factory: Bridgeburg, Ontario

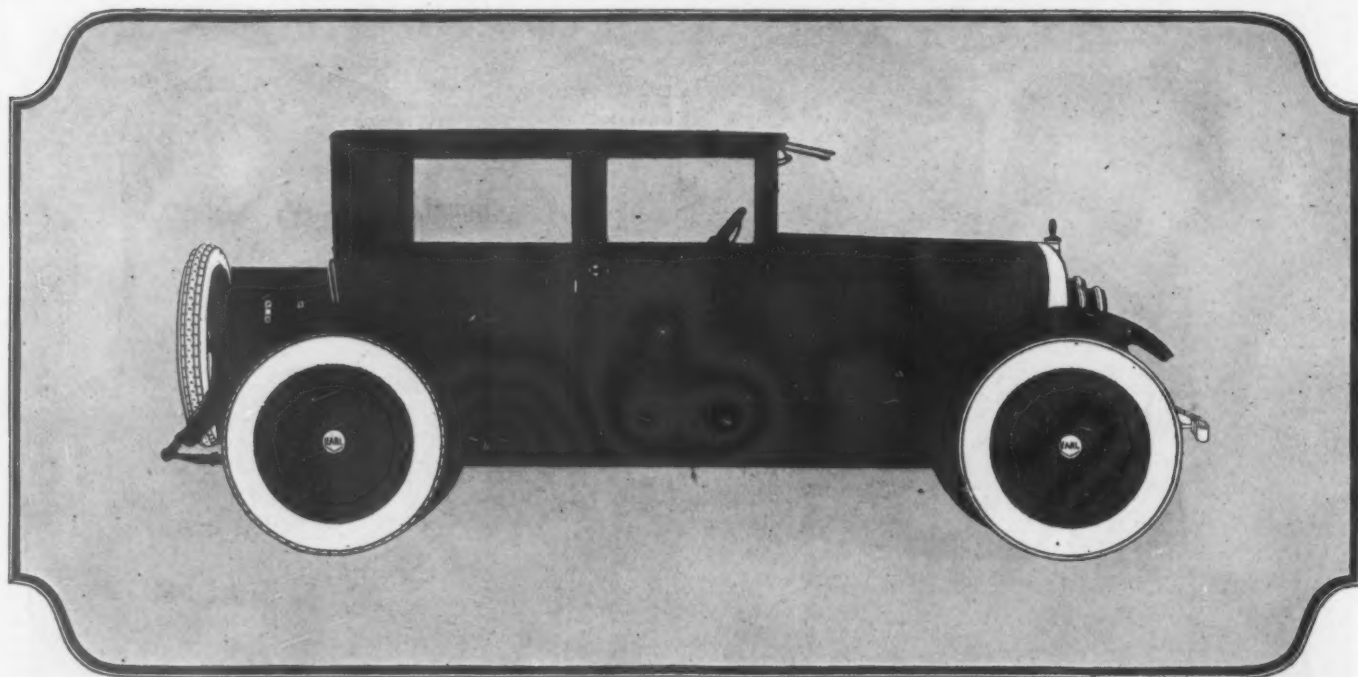
Branches and Distributing Agencies:

CLEVELAND
Fedders Mfg. Co., Inc.
3610 Superior Ave., N. E.
INDIANAPOLIS
Seth Klein Radiator Service Co.
820 North Meridan St.

NEW YORK
Henry Jellinek Co., Inc.
364-366 W. 50th St.

DETROIT
Olympian Radiator Repair Co.
218 W. Adams Ave.

BALTIMORE
Enterprise Auto Radiator Wks.
1908-1912 Frederick Avenue
SAN FRANCISCO, CALIF.
Feldmans Auto Metal Works
76 Eighth St.



The EARL Cabriole at \$1395

Unites dignity and charm with remarkable economy and comfort in a fine 4-passenger closed car

ALL the beauty, the friendly convenience and practical utility your prospects are looking for in an enclosed motor car, you can show them and sell them now in the new Earl Cabriole.

At \$1395, its tangible value is so great that it is bound to out-sell every other closed car in its price range. Thus far, it has been shown only at the factory, but already its success, measured by orders for immediate delivery, has been sensational.

Its character and uncrowded ease are suggested by the "comfort specifications" printed in an adjoining column. The distinction of its sweeping lines, the rich harmony of gray Spanish leather within and Earl blue and black without, must be seen to be appreciated.

The Cabriole is the right size—the right price—the right combination of good looks, economy, and ability to go anywhere a motor car can be driven. And it carries the right discount.

A great selling season for closed cars is just opening. And the Cabriole is the most astonishing closed car value ever offered. Write or wire for full information about this sensational new car and our contract terms. Some profitable dealer territories are still unassigned.

Touring Car	\$1095
Cabriole	1395
Custom Roadster . . .	1485
Brougham	1795
Sedan	1795
Prices f.o.b. Jackson	

EARL MOTORS, INC.

JACKSON



MICHIGAN

Comfort Specifications

Generous body dimensions, with a very low center of gravity and perfect balance, make for unusual riding qualities in the Earl Cabriole. Its over-all length is 14 feet, lacking one inch. Coupled with 56-inch rear springs, a rigid 7-inch channel frame with five cross members, and special spirals in tilted cushions, this roominess provides road comfort unsurpassed by cars of much greater first cost and operating expense.

Low sweeping lines give the Cabriole its special distinction. Its over-all height without passengers is only 74 inches. Head room is ample, however—from seats to top lining, 37 inches. The front tonneau is 53 inches long. The rear seat is 45 1/2 inches wide, seating three without undue crowding.

The very wide plate glass door panels are lever-controlled and can be raised or lowered without effort in the fraction of a minute. The one-piece, clear vision windshield swings inward or outward. Ventilation of the Cabriole, therefore, can be regulated to a nicety. The individual seats can be tipped forward at right angles, the backs folding flat. With the extra wide doors, this makes entrance and exit easy. The complete equipment includes sun visor, windshield wiper and dome light.

Full information about the Cabriole and four other striking Earl models on request. Wire or write to Jackson for the facts and our contract terms.

RUGGLES

Breaks Truck Records in National Distribution

Starting a new enterprise is always an uphill job. Getting the first hundred dealers is always the biggest problem for any automotive manufacturer.

Ruggles Trucks have rounded the 100-dealer mark. We're on our way to two hundred. Success is assured. Ruggles Trucks are in the hands of many owners—new dealers are closing—the Ruggles has proved its promise of prosperity.

Ruggles Trucks have the quality that means down-right service at a price that appeals to the nation's awakened sense of economy. Their phenomenal record of the last nine months indicates the profit possibilities a Ruggles franchise holds for you.

Write for details. Learn why the Ruggles has broken all records in building national distribution.

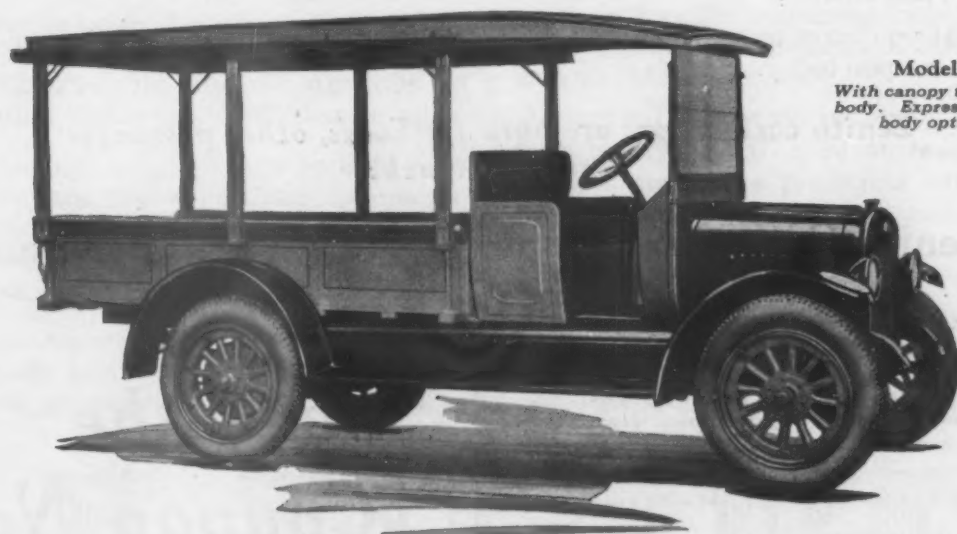
RUGGLES MOTOR TRUCK COMPANY, Saginaw, Michigan
Canadian Factory: Ruggles Motor Truck Company, Ltd., London, Ont.

Model 20
Capacity, 500 - 2500 Lbs.
(Chassis)

\$1195

Model 40
Capacity, 2000 - 5000 Lbs.
(Chassis)

\$1795



Model 20
*With canopy top express
body. Express or stake
body optional.*

TRUCKS

ZENITH



A Money Maker for You, too



with Our Free Trial Offer

Why not get these quicker, bigger profits?

Our 30-Day Free Trial offer to users is keeping dealers busy installing Zenith carburetors. They have an active, profitable business, plus the good will of buyers, whose satisfaction we guarantee.

They find, moreover, that motorists attracted by the Zenith offer, become good, permanent customers for other merchandise they may handle. For the way the Zenith makes good every claim, gives buyers confidence in the dealer who sold him the equipment, and in the quality of other articles he recommends.

If you want to share in the profitable business Zenith dealers enjoy send the coupon today.

Zenith carburetors are built for Fords, other passenger cars and trucks

Zenith Carburetor Company, Detroit, Michigan

ZENITH CARBURETOR COMPANY
Detroit, Michigan

Gentlemen:—I am interested in your Free Trial Sales Plan, and would like further information regarding a dealership or agent rights for my territory, which is

(Describe by Counties, Name, Towns and Cities)

Have been in this territory.....years, handling

(What business line)

Remarks:

Name

Address

***Send the
Coupon Now***

Some exclusive territories
are open

Show them where to get Alemite!



ALEMITE advertising in The Saturday Evening Post and leading newspapers is showing hundreds of car owners in your community why they can't afford to be without Alemite lubrication.

Don't force the new Alemite customers we are creating to go to the other fellow to buy what they want. Show them that you sell Alemite. Then you'll be the one to pocket the steady profits that come from Alemite sales.

Use the Alemite window sign to link your store with our big advertising campaign. Display an Alemite Counter Cabinet prominently. Suggest Alemite whenever you turn up a customer's grease cups or sell him gas.

Alemite dealers are supplied with the attractive Alemite cabinet free. It enables you quickly and accurately to equip any make or

model of car with Alemite. The Alemite Equipment Manual which goes with the cabinet shows you just what fittings are needed for every sale.

Remember that in addition to the money you will make on new Alemite Systems you will share in the established replacement business coming from the millions of Alemite-fitted cars already in service.

Dealers tell us that the increased trade which Alemite brings into their stores also means quicker and more profitable turnovers on their other merchandise. Send at once for the Alemite Dealer Plan if you want to make more money.

A Product of

THE BASSICK MANUFACTURING COMPANY
2650 N. Crawford Ave., Chicago, Ill.

Alemite Products Company of Canada, Ltd., Belleville, Ontario

ALEMITE

High pressure lubricating system

**"The Gears are cut
in hardened heat
treated steel!"**



The chamfer of the Logan gear teeth is an exclusive feature.

Ground to a rounded angle of 45°, they meet and engage with the starter pinion teeth quietly and easily.

The design affords maximum strength to each tooth.

**You may well take
pride in the Logan
Gears you install—**

Aside from the very substantial profit that is yours when you install a Logan Ring Gear—there is another good reason for being the Logan man in your territory.

And that reason is the good will which is always inspired when a good job is done for the customer.

Logan Flywheel Ring Gears inspire good will because they are of the very highest quality and will give unlimited wear without battering or stripping.

Don't confuse Logan Gears with inferior makes.

The Logan Gear is made of a hardened, heat treated steel bar formed into a ring and electrically welded at the joint.

It has no weak point.

The gears are cut to accurate pitch and then chamfered so that a perfect mesh with the starter pinion is insured.

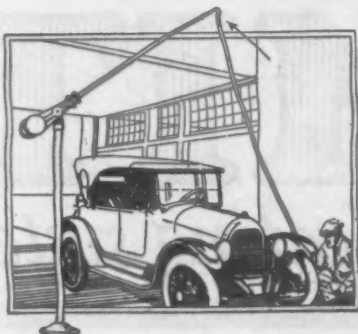
Installing Logan Gears is not difficult. Simply place the flywheel on a lathe and grind off the battered gears and then shrink on the Logan Ring.

It's a job you can take pride in and make money on.

Write for the details today.

Kauffman Metal Products Company
Bellefontaine, Ohio

LOGAN FLYWHEEL RING GEARS



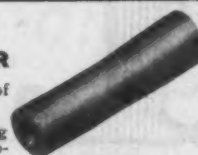
LOGAN AIR TOWER

A quick, clean, efficient way of serving air to the motorist.

The movable arm can be swung around to all four tires—the motorist can do it himself.

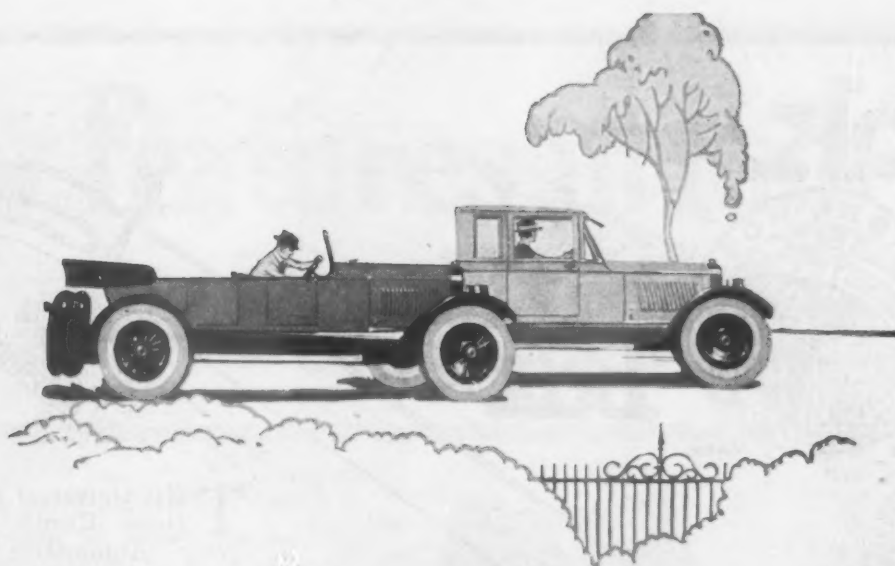
The LOGAN doesn't take much room. It can be placed where it will always be accessible and still be out of the way.

It makes your air service impressive.



LOGAN PRECISION PISTON PINS

Finished and semi-finished.
For every make of motor.
Carry a small stock of finished pins for popular cars.
Carry a small stock of semi-finished pins and grind them to fit special jobs.
The quality is 100 per cent.



ARE WOMEN BETTER DRIVERS THAN MEN?

A good automobile driver is, first, the driver whose mind is free from all worries and anxieties—whose first thought is upon driving the car.

A good automobile driver is, second, one who has confidence in the car which is being driven.

And confidence comes only from a thorough knowledge—a tested understanding—of how the car operates.

She, who knows just what happens when the clutch pedal comes back and the accelerator pedal is depressed—and tons are moved smoothly, swiftly, and majestically away—is a better driver than is she who does not know these important things.

She, who understands the generation of the power in the motor and its noiseless delivery through the transmission (or gear box); through the propeller shaft protected by its universal joints; how it is reduced at the pinion; and how it turns the corners at the differential, to be transmitted to the rear

or driving wheels; she will be best able to handle that car in every circumstance which arises.

A good automobile driver must have confidence in the vital parts of the machine, with a mind free to meet every road exigency. As a confidence-building knowledge of the car increases, so will increase the faith in Timken Tapered Roller Bearings to protect every horse-power, to eliminate every possibility of delay, bringing that assurance and peace of mind that good drivers must have.

That is why the driver of the Timken-equipped automobile is a more confident driver—and a better driver—than is the other.

And that, in turn, is why more and more women are asking him—the car salesman, the husband, the brother—“Has it Timken Tapered Roller Bearings, and where?”

For women today are just as much automobile drivers and automobile buyers as are men.

The Timken Roller Bearing Company
CANTON, OHIO

TIMKEN
Tapered
ROLLER BEARINGS




“Ask him to explain it”

“During the years I have studied traffic operation I have always found that women are more careful drivers than men; take more pride in their driving; are as efficient in emergencies; and as a consequence have less accidents attributable to them.”

—Former Safety Director
C. N. Sparks
Akron, Ohio

Look for this



on the box

It stands for a hose clamp that means more sales—better service and more profits for you.

*Look for the
Holes and
Scores*



THE Universal Adjustable Hose Clamp Covers Every Automotive Requirement Where Clamps Are Needed. Two Sizes Cover Every Job—From $\frac{1}{4}$ Inch on Up to Any Given Diameter.

You need hose clamps constantly. There are scores of connections on each car and truck which must be so made. Are you using and selling complicated, cumbersome and leak breeding clamps or the pliable, easy to handle, quick to install, leak proof "Universals?"

Why You Need Them

Again we say it:

There isn't a hose made that this clamp will not fit—from 1" to 3" and up to 6 feet in diameter, if necessary. Yet it comes in only two sizes, SENIOR 1" to 3" and JUNIOR $\frac{1}{4}$ " to 1 $\frac{1}{2}$ ". It consists of a band of tough, cold rolled ribbon steel, a bolt and a nut. In the band are holes every $\frac{1}{4}$ " of an inch apart. Simply clamp the band around the hose, insert the bolt in the nearest hole, tighten up the nut,

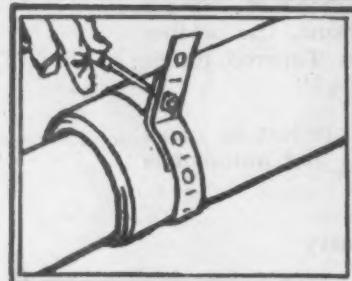
then break off the over-lap—that's all there is to it.

Universal Adjustable Hose Clamps are made from steel ribbons, cold rolled from wire. We make them in this way to avoid rough cutting edges. These clamp edges are smooth. They cannot injure the hose.

Look for the "bead" or ridge on the bolt and nut end. This refinement still further increases the pressure, insuring a perfect, leak proof job.

Order Universals

DEALERS: Your Jobber carries Universal Hose Clamps in stock. Demand that your next order is filled with Universal Clamps—they give 100% service, pay good profits and sell fast. Order from your jobber or write direct.



Universal Industrial Corp., Hackensack, New Jersey

Sole Manufacturers

CHICAGO, ILL.
F. C. West Corp.
616 S. Michigan Ave.

Department of Sales
PHILADELPHIA, PA.
T. Scott Eavenson
1533 Cherry St.

DALLAS, TEXAS
Knight-Smith Co.
2303 Main St.

BOSTON, MASS.
Burton Rogers Co.
755 Boylston St.

Junior Hose Clamps

Take from $\frac{1}{4}$ inch to 1 $\frac{1}{2}$ inch sizes. Particularly adapted for Garden Hose. A Fast Selling Hardware Accessory. Write for Details.



Patents Granted
March 20, 1917
March 1, 1921

UNIVERSAL HOSE CLAMP

Adjustable to fit any hose of any size

New Features in Rub-Tex Mats for Ford Cars

These new mats are WEATHERPROOF—they fit tight around the pedals and brake. Keep out the cold air in winter, the hot in summer, and the dirt and dust all the time. No increase in price for this important improvement.

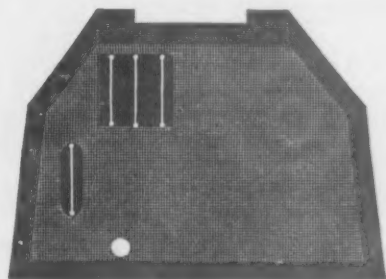
Your sales opportunities are greatly increased—for all Ford owners want these new mats. Splendid profits for you.

One big jobber says, "You are to be congratulated in making such a desirable improvement on an item of such general demand and use."

Rub-Tex Weatherproof Mats are much better than carpet. They are quickly cleaned with a hose or broom and instantly look like new. Cost less than carpet for Ford Sedans and Coupes.

ORDER NOW FROM YOUR JOBBER.

*"There's a Rub-Tex Mat
for Every Ford Car"*

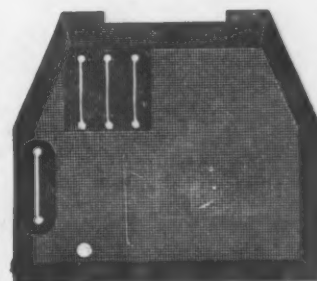


No. 250
For Ford Coupe

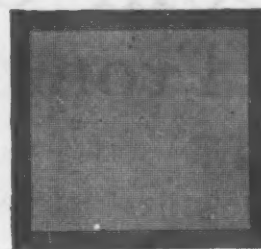


These two
mats com-
pletely cover
the floor of a
Ford Sedan

No. 500
For Ford Sedan



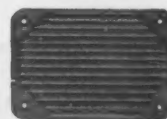
No. 145
For Ford Touring or
Roadster
1915 to 1922



No. 160
For Rear of Ford Touring



No. 150
Ford Special Step Plate



No. 20
Accelerator Heel Plate

Rub-Tex Step Plates are also made to fit the metal steps on cars without running boards and the metal step plate frames on cars with running boards.

Look for This Trade Mark



RUB-TEX PRODUCTS, INC. Indianapolis - Indiana -



Coin Silver From the U. S. Mint

Large collapsible
tube, \$1.00

Small collapsible
tube, .50

No wonder it shines!

It has just been coated with real coin-silver—in one minute—with a bit of rag and a little rubbing.

KWIK-AK-SHUN Silver-Nickel Plating Paste is the most wonderful renewer of metal surfaces ever developed.

Removes the tarnish, cleans the surface, deposits a coat of pure coin-silver.

Unequaled for refinishing worn or tarnished reflectors of any type headlights, or any part or equipment made of silver, silver-plated, nickel, nickel-plated, brass, copper—in fact, any metal that can be silver-plated.

Don't wear your metal fixtures away with gritty, abrasive "polishes."

Renew them, add to their finish and value, as well as to their looks, by a brief, easy application of KWIK-AK-SHUN Paste.

Get it for your Shop, or your Shelves, to-day!

For sale by Leading Jobbers
Full Information on Request

UNITED STATES PRODUCTS CO.

Sole Manufacturers

Pittsburgh

Pa.

Sales Division:

EDWARD A. CASSIDY CO., Inc.

23 West 43rd Street

New York City

KWIK-AK-SHUN

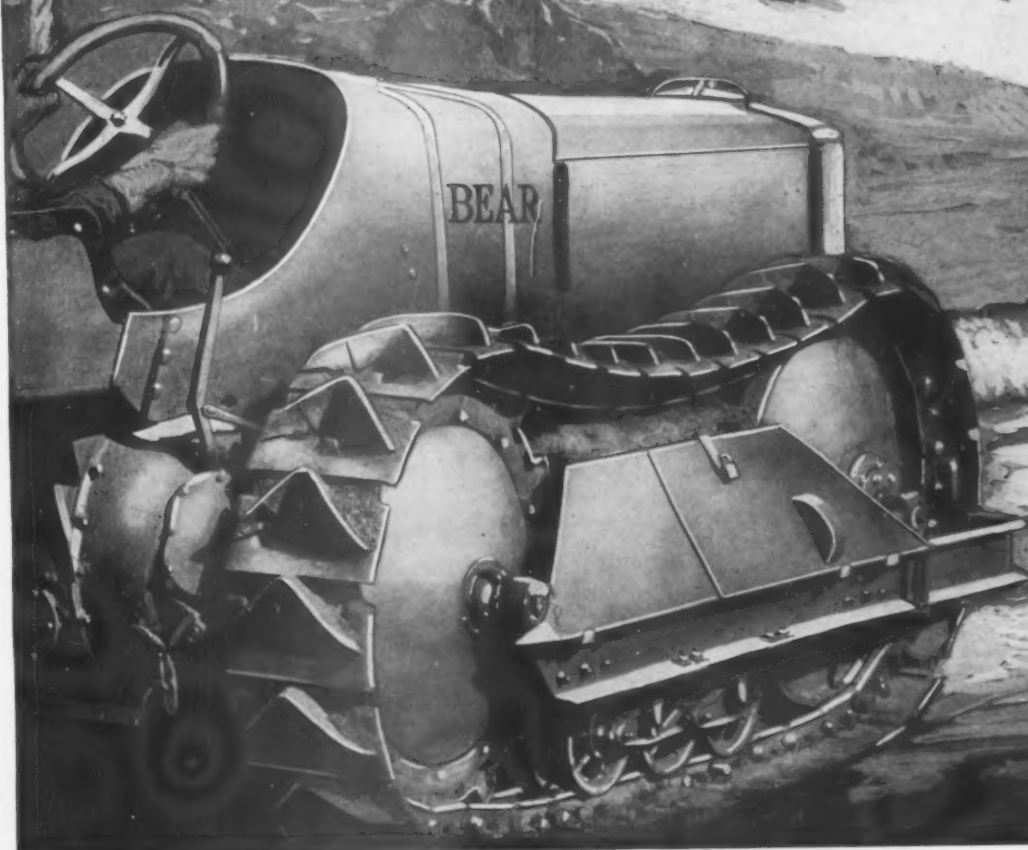
TRADE MARK REG. U.S. PAT. OFF.

(QUICK ACTION)

SILVER-NICKEL PLATING PASTE

Pure Coin-Silver from U.S. Mint

On the Road

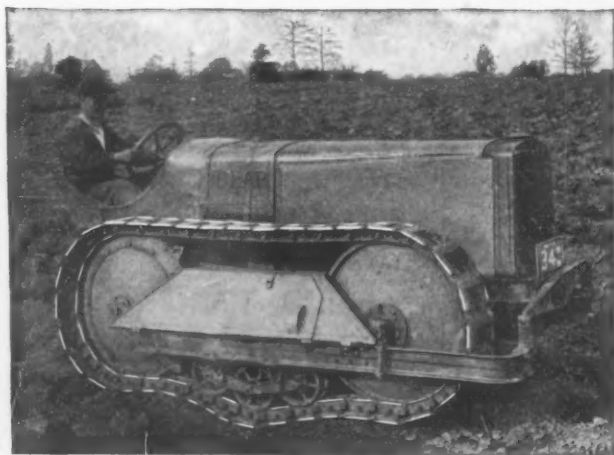


Bear Tractor

The Tractor that Delivers its Power to the Drawbar

The Bear Tractor

25-35 "Crawler" Type Tractor



Note how the track conforms to the irregular surface and grips the ground—in this case fitting into a depression. Now look at the corresponding view on the opposite page.



Never before in a tractor has there been anything like the Bear Flexibility, as you will observe in this and the picture opposite.

THE Bear might have been rated much higher than 25 horse-power at the drawbar, but, with its extremely conservative rating of 25, a margin of reserve power is available, insuring more continuous work—much less time out for repairs—and 100% overload capacity awaiting emergencies. In the final analysis it is horse-power AT the drawbar that counts—whether the tractor is pulling freight, road machines, plows or any other kind of load.

Just Compare These Features

Light Weight

5,500 lbs. net; 6,000 lbs. with fuel, oil and water—3.5 to 3.9 lbs. ground pressure per square inch—2 tons lighter than competing tractors.

Extreme Compactness

Over-all dimensions: 118 inches long; 60 inches wide; 54 inches high; 6 feet turning radius. The photographic illustrations on this and the page opposite show the extreme compactness of the Bear.

Once-a-month Oiling

Oiled throughout from reservoirs—no waste of time each day with "greasing up"—not a grease cup on the tractor.

Remarkable Drawbar Horse-Power

80% of the engine's power is delivered at the drawbar, actually available for pulling—an efficiency never before equalled.

Compensating Track Roller System

This system equally distributes the weight of the tractor so that the track conforms to the irregularities of the ground, and maintains uniform traction. Observe this feature in the pictures.

Heavy Duty Engine

Heavy duty, valve-in-the-head engine—made especially for hard tractor work—its $2\frac{7}{8}$ -inch crank shaft of chrome nickel reflects its quality.

"The Tractor that Delivers

This phrase implies an unmatched mechanical efficiency in delivering the engine's power to the drawbar. In figuring tractor values, first cost of a tractor is only incidental. It is *operating* cost per *drawbar* horse-power and *maintenance* cost per *drawbar* horse-power that determine the *real* cost of work done by a tractor,

The Tractor that Delivers its Power to the Drawbar

The Bear Tractor

with 100% Overload Capacity

THE Bear has unequalled *drawbar* horse-power for its size, weight and engine capacity. Add to this remarkable *drawbar* horse-power such exclusive features as its great compactness, its extreme flexibility, its compensating track roller system, its no-trouble track, its annular ball bearings, its once-a-month oiling system, and you have the reason why the Bear has succeeded in establishing for itself a *new* and *exclusive* position in the tractor field.

with Those of Any Other Tractor

Steel Cable Drawbar

A *resilient* drawbar! Attached to the track frame forward of center and below center of gravity—pulls down in front and increases traction.

Ball Bearings Throughout

Here's one reason for so little waste of power in the Bear—annular ball bearings—36 of them! No plain bearings and no adjustments.

A Big Fuel Tank

The gas tank holds 42 gallons—ample supply for 10 hours' work under full load. The fuel line is of airplane metallic hose.

Great Flexibility

The flexibility of the Bear is shown by the accompanying pictures. The extreme ranges of the Oscillating Bar and the Compensating Track Rollers give the Bear a mobility heretofore not approached.

No-trouble Track

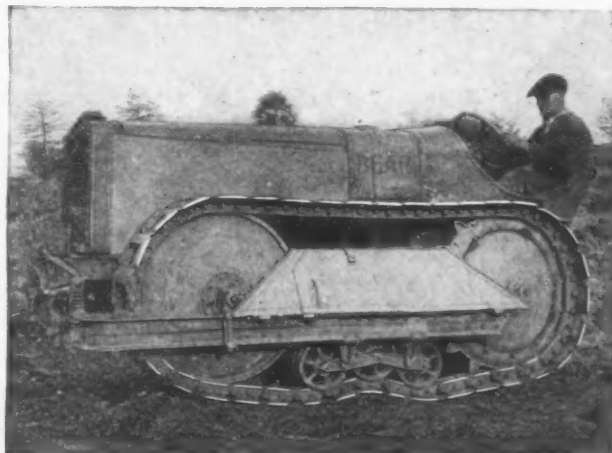
Of all the exclusive features that make up its excellence, perhaps none distinguishes the Bear more than the Bear Track—it causes *so little trouble* and *so little expense*. It is adjusted by a single lever.

Easy Control and Comfortable Seat

It is as easy to operate a Bear Tractor as an automobile—and equally comfortable. The control is essentially the same as on a standard car.

its *Power to the Drawbar*"

because it is *performance* that tractor users buy. On this basis the Bear sets a new standard for low cost. Its overload capacity—its surplus power—combined with its extreme compactness and great flexibility, gives the Bear an unlimited range of usefulness in tractor work. Read the Bear Specifications on the following page.



Here you see the track as the tractor passes over a sharp rise. Observe how the track grips the ground throughout its full length—no teetering. This means perfect traction.



Bear Flexibility, as shown not only here but in the pictures illustrating the track, means adaptability to a wide range of work.

The Tractor that Delivers its Power to the Drawbar

The Bear Tractor

Where Bear Tractors Are Made



Bear Specifications

Engine—Four-cylinder; tractor type.

Bore and Stroke— $4\frac{3}{4} \times 6\frac{1}{2}$.

Valves—(in head) $2\frac{1}{4}$ " diameter.

Crank Shaft— $2\frac{7}{8}$ " diameter, chrome nickel steel.

Ignition—Bosch magneto, with automatic impulse starter.

Governor—Simplex; gear driven.

Carburetor—Schebler carburetor. Latest model, especially designed for burning low grade fuels.

Fuel Tank—Capacity, 42 gallons.

Air Clarifier—Highly efficient; especially designed; oil type.

Engine Clutch—Five plate; dry.

Cooling—Spirex sectional radiator. Forced feed pump, gear driven fan, delivering 9,000 cubic feet of air per minute.

Lubrication—Forced feed to all engine bearings, including valve gear.

Transmission—Spur gear type. Unusually large margin of safety insured by use of coarse pitch, wide face, chrome-

nickel, double heat-treated gears, as well as short, heavy shafts of same materials. Three speeds forward, one reverse.

Drive Clutches—Multiple disc, running dry, 19" diameter, exclusive BEAR design.

Bearings—All of annular ball type throughout, packed against leakage of oil and entrance of dirt.

Track—Drop forged, running dry, each unit readily detachable; of known performance and superior wearing qualities.

Tread Wheels—Front and rear wheels 32" diameter.

Grousers—Knife-edge, drop-forged, readily detachable for road work.

Length of Tread—On ground, 64"

Width of Tread—12"

Area on Ground—1,536 square inches.

Weight—5,500 lbs. net. 6,000 lbs. loaded with fuel, oil and water.

Ground Pressure—3.5 to 3.9 lbs. per square inch.

Turning Radius—6 feet.

Horse-Power Rating—25 h.p. at drawbar; 35 h.p. at pulley—100% overload capacity.

Normal Drawbar Pull—3,000 lbs.

Speeds—5.9, 3.4 and 2.1 miles per hour; 2 miles per hour in reverse.

Steering—Both treads are controlled by steering wheel operating individual multiple disc clutches on tread drivers. Five pounds pressure on the steering wheel operates the clutches.

Belt Pulley—Standard pulley is 12" diameter by 9" face. Other sizes obtainable on special order.

General Dimensions:

Width—60"

Width over Tracks—55"

Height over Tracks—42"

Height over Radiator—54"

Length—118"

Length, Exclusive of Seat

Overhang— $112\frac{1}{8}$ "

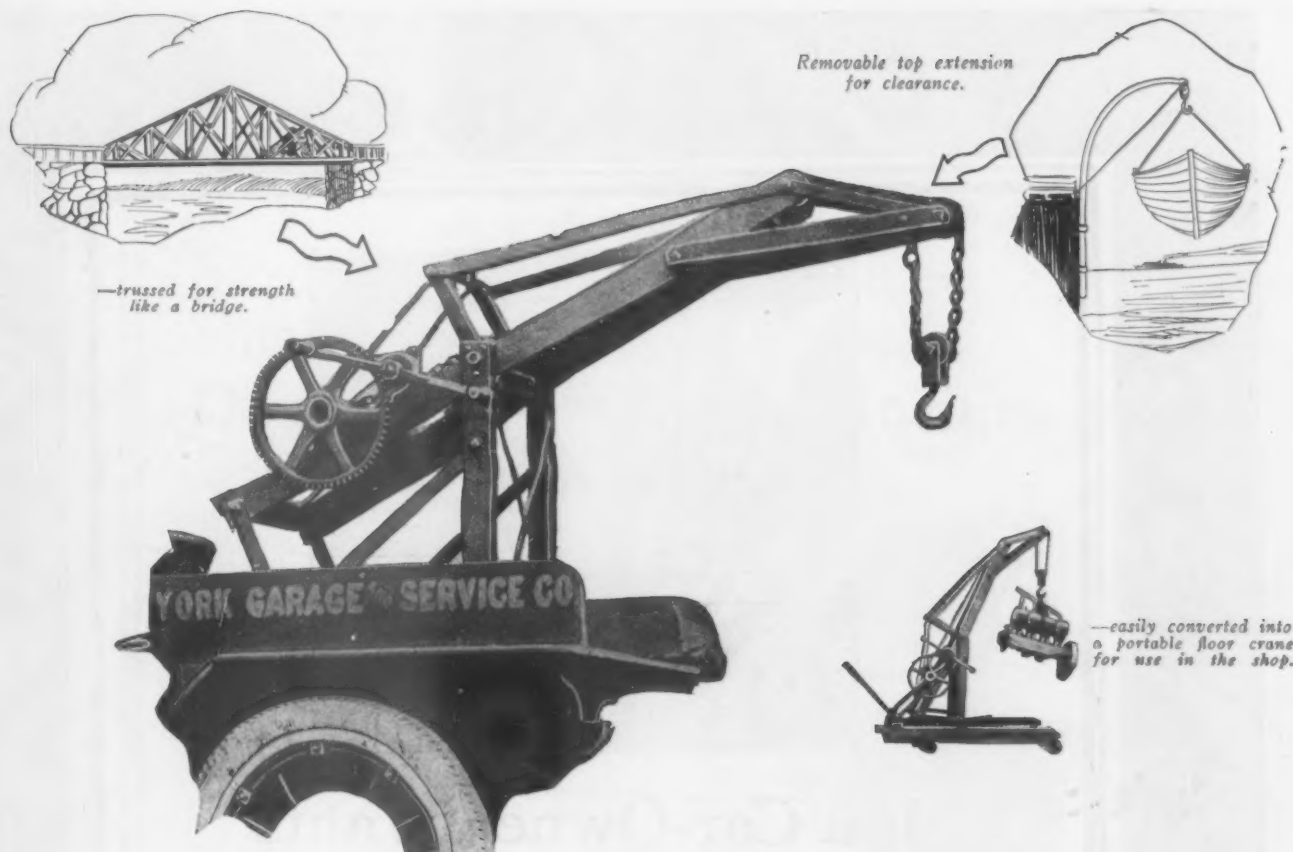
Clearance—11"

Number Plows Recommended—Four 14"

Price \$4250

BEAR TRACTORS INC., 53 PARK PLACE, NEW YORK CITY

The Tractor that Delivers its Power to the Drawbar

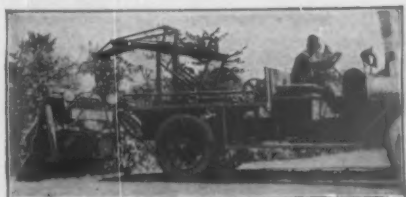


These are the Reasons for the Overwhelming Superiority of the Manley Wrecking Crane

They are Exclusive and Patented



Beam Vertical, Top Extension Removed



By tilting the beam to any angle, every wreck may be handled to advantage.

THE beam tilts quickly to any angle desired. It may, therefore, be positioned to suit every kind of a job.

The beam is double trussed for rigidity and safety.

The removable top extension is a tremendous advantage to allow a shorter hitch.

By tilting the beam to the vertical position, the hoisting drum is positioned properly to use the Crane as a winch.

The saddle construction imposes a minimum strain on the chassis. The four leverages provide for any kind of a pull with greatest efficiency.

Its construction, consisting of four units, permits quickly and easily removing Crane from chassis.

Its 2-ton rating is most conservative.

Speaking of Manley Wrecking Cranes, a leading shop man of Philadelphia writes:

"I couldn't possibly run my business without it."

"I have never seen a Wrecking Crane that could touch the Manley for strength, construction or utility. I couldn't possibly run my business without it."

Also a Garage Crane

By removing six bolts, it can be immediately converted into a portable shop crane. Its high lift, deep overhang, low base and light weight makes it ideal.

Your inquiry for further information about this or other Manley shop and labor saving equipment will receive immediate and personal attention.

MANLEY MFG. CO., YORK, PA.

"The Well-Equipped Shop Gets the Business" with
Manley
Garage Equipment
MADE IN YORK PA.



If a Car-Owner Wants Tire Mileage

*Tell him to buy a Schrader Tire Pressure
Gauge and USE IT*

No car-owner can expect maximum mileage unless he keeps his tires properly inflated at all times.

He can't do this unless he owns a tire gauge.

The man who doesn't own and use a tire gauge, guesses about his air most of the time.

The idea of a tire gauge is to stop guessing about tire inflation.

Advise your customers to own a Schrader Tire Gauge, and if they don't own one to buy one.

Its use is simple; it is always accurate; it will last for years.

Order a stock now of Schrader Tire Pressure Gauges from your jobber. They are easy to sell because they are needed—and there's worth-while profit in it for you

Manufactured by A. SCHRADER'S SON, Inc., Brooklyn, N. Y.
CHICAGO TORONTO LONDON

SCHRADER

TIRE-PRESSURE-GAUGE

You Can Do a Good-Sized Business on Valve Caps, Dust Caps, and Valve Insides

No man wants to drive around with his valves uncovered—no valve cap and no dust cap. Let your customers know that you have them for sale.

Schrader Valve Insides

Many car-owners like to have several spare valve insides in the tool kit. Packed five in a metal box.

Schrader Valve Caps

Seal in the air. Half the cars you see need from one to four valve caps. Schrader Valve Caps in metal boxes of five are ready sellers when offered for sale. They are simple, effective, and economical for sealing air in a tire.

Schrader Dust Caps

Quickly removed or replaced. Protect the valve from dust and dirt. Will not shake off. Combination Rim Nut and Dust Cap Bushing illustrated, provides for quick attachment and removal of Dust Cap.

CAUTION: Apply Rim Nut with wrench or pliers, but do not use either of these on the Dust Cap, which should be screwed on by hand only—not necessary to force Dust Cap tightly against nut, but only sufficiently to seat the Dust Cap.

Schrader Pump Connection

For use on foot pumps. Air pressure can be tested without removing pump hose from valve.

Schrader Valve Repair Tool

A useful little tool, handy to every man who makes his own minor repairs. Order a stock now from your jobber.



Manufactured by A. SCHRADER'S SON, Inc., Brooklyn, N. Y.
CHICAGO TORONTO LONDON

SCHRADER

TIRE-VALVE-ACCESSORIES

The DeLuxe Ventilator



Only
\$1.75
Retail

Put Comfort in your Customers' Summer Driving

A DELUXE VENTILATOR overcomes that stifling heat which wells up under the Ford cowl and radiates back into the car—the torture of summer driving.

A DeLuxe Ventilator with its anti-rust screen keeps out the flies, gnats, bees, and bugs; makes driving cleaner, eliminates draughts in the car and on the passengers.

A DeLuxe Ventilator adds to the appearance of the car and to the comfort and satisfaction of the owner. Every Ford owner wants a DeLuxe Ventilator. You have only to show him how perfectly it works and how quickly it is installed and the sale is made. It is a find at \$1.75.

We Help You! Folders, counter displays, newspaper cuts and advertisements are ready for you with your first order. A free tool and full installation directions furnished with each case of one dozen. Get your sample outfit today. Order direct if your jobber doesn't carry.

Don't lose out on the profits.

Indianapolis Pump and Tube Co.
Kentucky Ave. and Drover St., Div. B6, Indianapolis

Wire for Your
Sample Outfit Today



DeLuxe Ventilators
—for Summer Comfort
Arvin Heaters DeLuxe
—for Winter Comfort
DeLuxe Tire Pumps
—the Year 'Round

**DE LUXE
Products**

— for the Motorist's Comfort



FREE

*This Dreadnaught
"ASK-EM-TO-BUY"
Cabinet
Free To Dealers.*



Better Chains—Packed In Cartons Displayed In An "ASK-EM-TO-BUY" Cabinet.

We've abolished barrels, and ship in handy 10-carton crates; they save time and expense in re-shipping, and room in stock.



We've abolished bags; they're dirty, clumsy, useless. Our chains now come packed in attractive, waterproof fibre containers, two chains to a carton. Your customers like these permanent chain carriers.

Dreadnaught Tire Chains are superior, because of the diamond-hard, coppered cross chains and the patented lever fastener.

Dreadnaught Chains come packed in clean, strong, attractive, waterproof fibre cartons instead of dirty, clumsy bags. Customers like 'em. Shipped in crates of ten cartons, instead of barrels—easy to handle, and sell to your customer. The free Display Cabinet keeps stock where it sells itself.

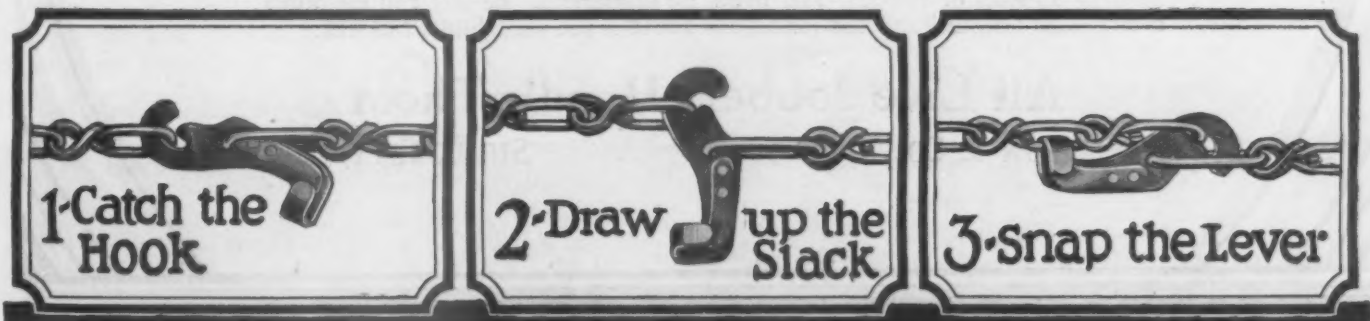
A small stock order will bring the Dreadnaught Tire Chain Cabinet to you.

Jobbers: We sell through jobbers only. Our proposition increases sales and saves you time more ways than one. Write for particulars. *Dealers:* If your jobber doesn't sell "Dreadnaughts" yet, send us his name. We save you time and money, and increase your sales. Send for free sample of chain and patented lever lock fastener.

The Columbus-McKinnon Chain Co.
Columbus, Ohio

Dreadnaught Tire Chains

The "Lever" Locks the Chain



SIoux VALVE LATHE



No. 600

PATENTED:
Feb. 17, 1914
Nov. 26, 1918
Others pending

Refaces Valves with Accuracy and Speed

Takes care of small jobs as well as the large. Refaces valves from $1\frac{3}{8}$ " to $4\frac{1}{2}$ " with either a 30, 45 or 60 degree angle.

The Sioux Valve Lathe is simplicity itself. No tedious adjustments. So simple a novice can operate it. More accurate than a machine lathe.

Cutter can not get out of line. Round cutter insures smooth face on any steel or cast iron valve, without shattering or leaving ridges and gives unlimited cutting edge—will outlast ten ordinary cutters. Valve is self-centering in lathe. Clamps hold valve in alignment. All adjustments accurately and permanently built into tools. Fully equipped with proper springs for handling all sizes of valves. Has two cranks—one for small and one for large

valves. Lathe will fasten permanently to bench or fit into a vice.

SIoux SERVICE keeps cutter sharp at no cost to you but carrying charges. When cutters get dull, send them prepaid and direct to us, including return postage, and they will be sharpened and returned the same day received. We maintain a special department for this service. Be sure you get **SIoux TOOLS** if you want **SIoux SERVICE**.

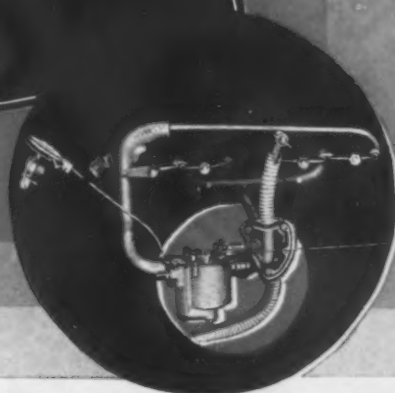
All Live Jobbers Handle Them

ALBERTSON & Co.

SIoux CITY, IOWA

OFFICIAL TEST

51 $\frac{6}{10}$ miles
on a gallon
of gasoline



A standard Ford car carrying three passengers—total weight of car and passengers 2370 pounds—was recently driven 51 $\frac{6}{10}$ miles on one gallon of 57 test gasoline.

This world's record mileage test was made under observance of American Automobile Association. Minimum speed was 6 miles per hour—maximum speed 45 miles per hour.

The Ford was equipped with new 1922 Stromberg Carburetor and Hot Spot—that's what turned the trick.

Easily installed. Low price—\$15.75 for Carburetor and Hot Spot complete.

Attractive proposition for good live dealers—write for details.

Stromberg Motor Devices Co., Dept. 727, 64 E. 25th Street, Chicago, Ill.

Stromberg
 with the Stromberg

**HOT
 SPOT**

Carburetor
 for Ford Cars

Same Overhead—Increased Profits

Wire us—or mail Extra Profit Coupon below

SPEED up turnover. Cut down overhead. Make more sales with no additional expense. Increase profits.

How? *Sell Hayes Demountable at the Rim Wire Wheels.*

Every car owner *wants* wire wheels—has probably decided that sooner or later he will *buy* wire wheels. He has just been waiting for the *right* wire wheel. Be the first in your town who *sells* it.

The Hayes is the wire wheel motorists have waited for—the first practical demountable at the rim wire wheel.

Easy to install—convenient for quick tire change—light in weight—moderate in price—the Hayes Demountable at the Rim Wire Wheels sell at sight to every car owner.

Your field for sales is unlimited. Every owner of a Ford, Nash, Durant, Earl, Dodge, Chevrolet and other makes, is a prospect. Just demonstrate the Hayes Wire Wheels to them—they sell themselves, and what is more we *help* our dealers sell them.

Hayes has always stood for dependability in wheels. Of all the cars produced today, 54% are Hayes equipped. The immense resources which have made this achievement possible are back of Hayes Demountable at the Rim Wire Wheels. You can back them—we will back you.

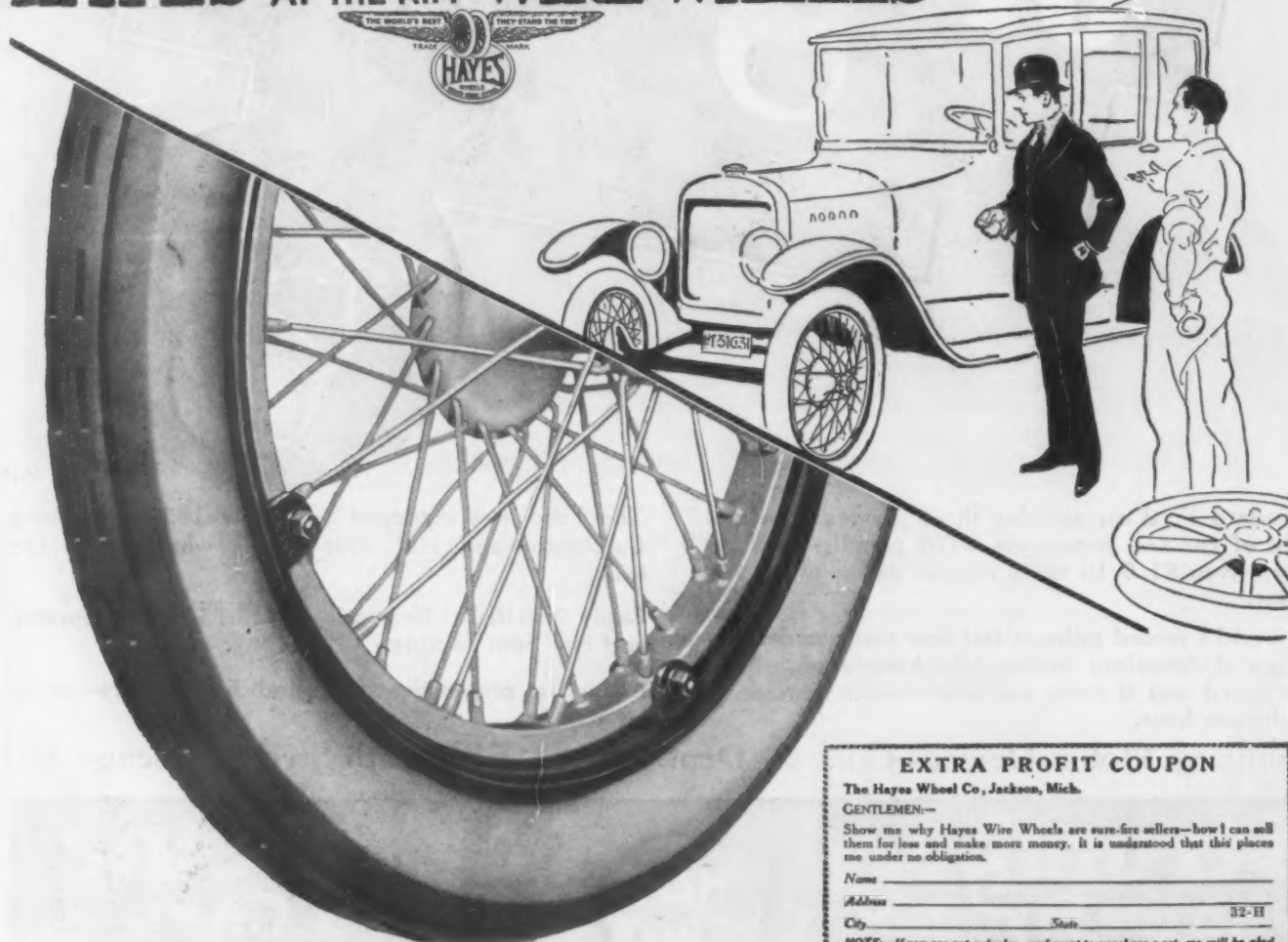
Read the selling points. Learn why Hayes Wire Wheels are best from both standpoints—dealers and car owners. Convince yourself. Then wire us or send the coupon today.

Six Strong Selling Points

- 1 One-piece steel felloe, of channel steel, well adapted for assembly of the wire spokes and gives perfect support to the rim.
- 2 Rim supported front and back by in-rolled bead, excludes dirt. Provides ideal attachment for lugs.
- 3 Tapered nuts fit countersunk holes in lugs and act as lock-nuts.
- 4 Lugs are made from mill-rolled bars. Riveting portion integral with lugs. No castings used.
- 5 Demountable rim lugs permanently attached to rim, eliminating driving studs.
- 6 Integral hub makes wheel interchangeable with wood wheel.

HAYES WHEEL COMPANY of New York JACKSON, MICHIGAN
Branches: New York Chicago San Francisco Indianapolis
Stocks Carried in Principal Cities

HAYES DEMOUNTABLE AT THE RIM WIRE WHEELS



EXTRA PROFIT COUPON

The Hayes Wheel Co., Jackson, Mich.

GENTLEMEN:—

Show me why Hayes Wire Wheels are sure-fire sellers—how I can sell them for less and make more money. It is understood that this places me under no obligation.

Name _____

Address _____

City _____

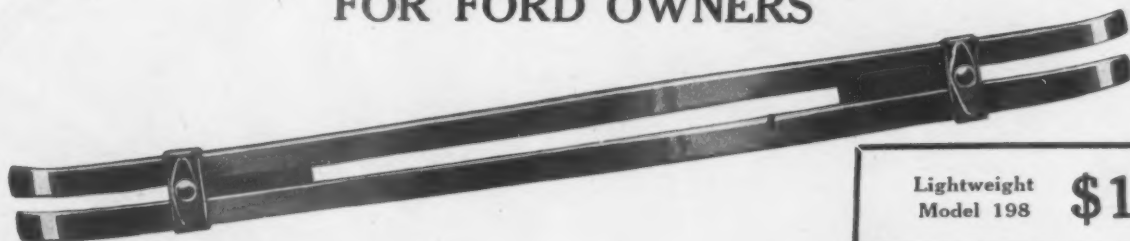
State _____

32-H

NOTE:—If you are not a dealer, and want to purchase a set, we will be glad to refer your inquiry to the nearest dealer handling Hayes Wire Wheels.

100% BUMPER PROTECTION

FOR FORD OWNERS



Lightweight
Model 198

\$12



Model 198 is furnished for front or rear installation. When installed, it gives the car a well balanced appearance. The double rails insure 100% protection.



The front hole of the Autoguard mounting bracket is fastened with a U bolt connection to a stud installed on the end of the front fender brace. With a longer bolt furnished with the set, the rear end of the bracket is bolted to the car frame, after removing bolt supporting rear fender brace. No drilling required.

THE three prominent features of the new Stewart Model 198 Autoguard make it a "live wire" addition for the bumper line of every dealer.

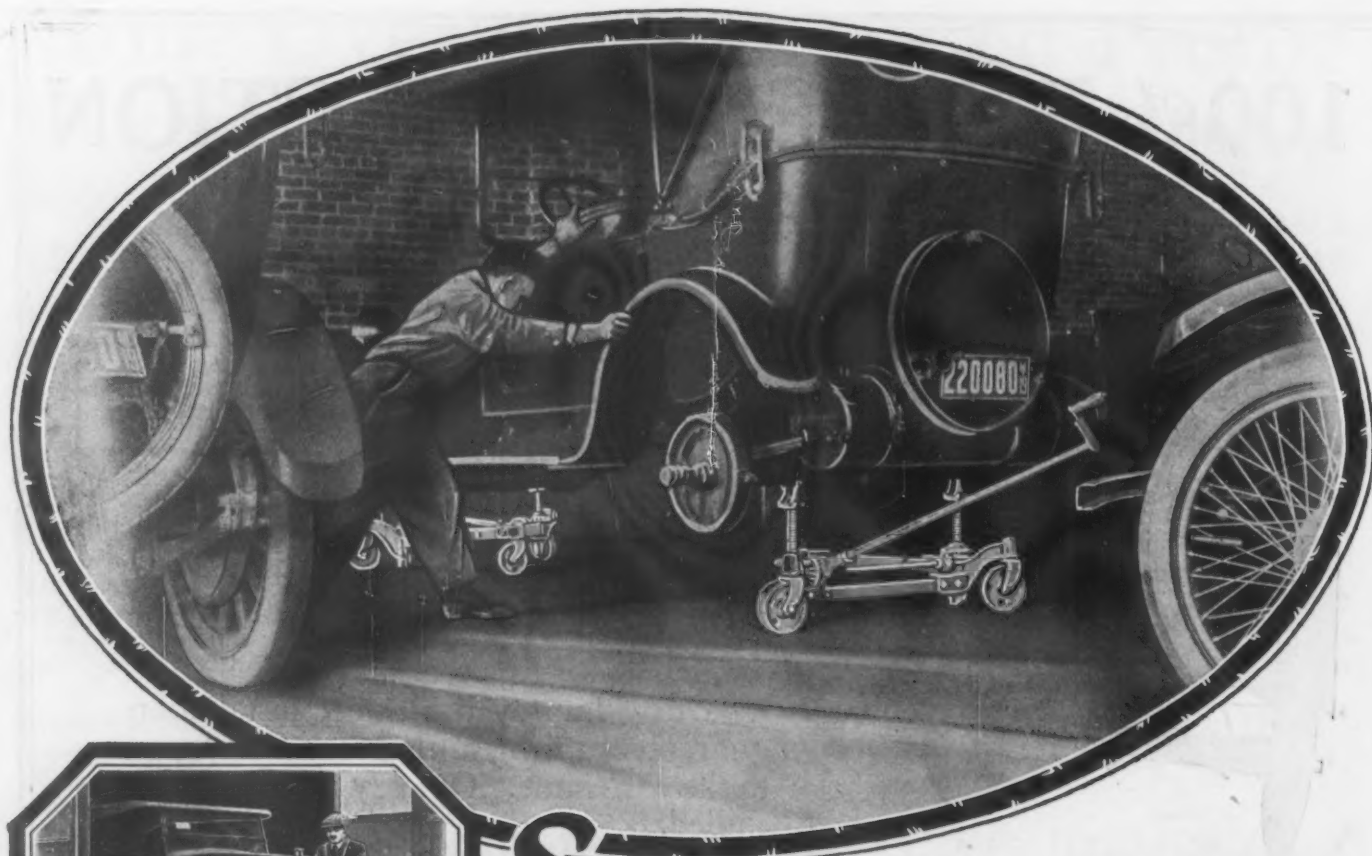
1. The new improved all-steel installation guarantees a firm, rattle-proof anchorage to the car frame. Quickly and easily installed.
2. It offers 100% bumper protection. Double rails extending the full width of the car prevent another bumper from slipping above or beneath to damage fenders, headlights, etc. The guardrails are of a lightweight but sturdy construction—not too heavy for the frame of the car.
3. The price is attractive. You can feature this double rail model at \$12. With nickel-plated rails, \$17.

DEALERS: Advertising on Stewart Autoguards includes full page advertisements in the Saturday Evening Post, Motor and Motor Life. Magazine advertising was supplemented with a nation-wide newspaper campaign and a coast to coast poster and painted display. Model 198 is only one of the many models of Stewart Autoguards, the most widely advertised line of bumpers on the market today.

Write for our Autoguard Catalogue, giving complete information on all models and installations.

Stewart
PRODUCTS

STEWART - WARNER SPEEDOMETER CORPORATION, CHICAGO, U. S. A.



*A great help in
unloading cars*

If you've ever unloaded automobiles from freight cars, you'll appreciate what a big help these Jacks will be in this work.

The castor wheels enable the operator to shift the car in the desired direction with little effort and very little space is required for manipulation, as the Jacks are confined within the limits of the car.



*If you would like
to know more about
these Jacks and other
Weaver profit increasing
equipment, write
for our catalog—
today*

Speed up repair jobs in your shop with **WEAVER Twin-Jacks**

EVERY square foot of floor space in your shop represents a definite investment. It's up to you to make each pay a profit. You can't, if you are propping up dismantled cars on boxes and wooden horses so that they're hard to move around and thus tying up the most valuable floor space in your shop.

Think how much time and labor you would save by using Weaver Auto Twin Jacks. With one of these Jacks under each axle *one* of your mechanics can easily move the car wherever it is needed in the shop.

The safety features of this Jack---the two point support, screw hoisting mechanism and broad wheel base---will appeal to your mechanics, too. They will do more and better work, because they know there's no danger of injury.

WEAVER MFG. CO.

SPRINGFIELD, ILLINOIS, U.S.A.
CANADIAN FACTORY, CHATHAM, ONTARIO.



A thief can pick a lock but— he can't read your mind!

CAN you think of a stronger selling argument for an automobile lock that is even more secure than a bank safe combination?

You set the combination yourself and YOU are the ONLY person that can open the lock.

WHAT CHANCE HAS A THIEF GOT?

He can't figure out the combination by listening to the tumblers fall—a "falsifier" in the lock balks the sound. And as for breaking the lock—he might as well take off the dash board.

The **DEFIANCE** is a revelation. It is the long sought for **THIEF-PROOF AUTO LOCK**.

The crook isn't merely put at a disadvantage, now, as he was by the ordinary lock—he's absolutely **BLOCKED**. The only chance he's got is to get the car owner to tell him the combination.

A real opportunity awaits the Distributor, Dealer, Garage, and Service Station.

Automobile thefts have grown to be so common that a market has been automatically created for the **DEFIANCE**. Insurance covers loss by theft BUT it doesn't provide a car to use four or five months while the Company is trying to locate the stolen car.

There is a tremendous field—a waiting public—millions of pocketbooks open and ready to exchange good American money for the lock that actually makes a car as safe—yes, even safer—than a bank vault.

The **DEFIANCE** is an exceptional proposition for the Dealer and Jobber.

A few County and State rights are still open. These will be closed with responsible parties. Write at once for full particulars.

The **DEFIANCE** is made of special, hardened steel and is attached around the steering post right against the dash board. By a simple reaching forward of the hand, it is locked and unlocked.

Lock cannot be tampered with without removing steering post.

Set the lock at any combination you choose—change it as many times as you wish.

It is neat—attractive—and complies with State and Municipal laws.

DEFIANCE AUTO LOCK CORPORATION
Allentown, Penna.

DEFIANCE Auto Lock

"Responds to personal touch only"

To sell Rusco Brake Lining

**RUSCO
BRAKE
LINING**

YOU can bend Rusco Brake Lining double, and then bend it double in the opposite direction without even cracking it. And this bending will not weaken it enough so you can tear it even slightly. This makes a good demonstration of its flexibility and toughness to show customers, and it means that Rusco does not wear down to a hard slippery surface. It keeps its grip.

To guarantee uniform quality we spin our own asbestos yarn. We make each thread of two or three strands of yarn and two strands of the best brass wire. Then we "solid weave" the lining on looms of our own special construction. There is no rubber in its treatment, so it holds just as well in wet weather as in dry. You can always guarantee Rusco to give satisfactory service.

THE RUSSELL MANUFACTURING CO.
Middletown, Conn.

Every

RUSCO PRODUCT

is made for service

Rusco Brake Lining
Rusco Clutch Facings
Rusco Hood Lacing
Rusco Tow Line
Rusco Fan Belts
Rusco Tire Straps
Rusco TABBUCKLER
Straps
Rusco Emergency Brake
for Fords
Rusco Transmission
Lining for Fords



RUSCO

demonstrate its flexibility

Rusco Brake Lining



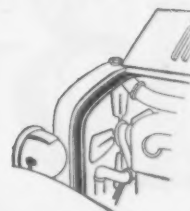
Rusco Brake Lining is actually solid woven and is 90% asbestos and brass wire. Every thread is a woven thread. There is no stitching, nor are there any loose "gutting" threads to break and cause rapid wear. Perfect braking in wet or dry weather. Being oversized and compressed, it wears remarkably long.

Rusco Tow Line



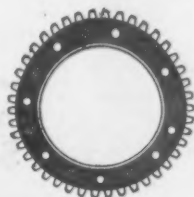
Recognized as essential equipment for all cars. Lighter than chain or wire cable and just as strong. Patented buckle guaranteed not to slip. Hauls any load.

Rusco Hood Lacing



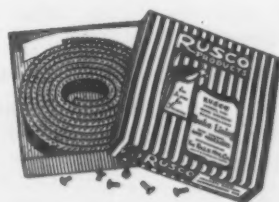
Solid woven lacing. Guaranteed to stay soft, pliable and "quiet."

Rusco Clutch Facing



Contains nothing but asbestos and brass wire solid woven. Excess treatment baked out. Being compressed there is more material in the same space and consequently more wear.

Rusco Transmission Lining for Fords



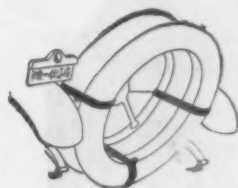
Heaviest, most durable transmission lining for Fords. Solid woven. Thick enough to countersink rivets, which helps to end chatter.

Rusco TABBUCKLER Straps



Straps of any size or length made complete in a few seconds, with patented buckle and tip. Knife and hammer only tools necessary. Fits a thousand needs of the motorist.

Rusco Tire Straps



Fine quality cotton webbing that will not fade. Waterproofed but is never sticky. Patented buckle will never lose spare tires on the road.

Rusco Fan Belt



Woven endless. Sizes to fit any car using flat belt. Outwears leather. Guaranteed to remain soft and flexible.

Rusco Emergency Brake for Fords



Made of cold rolled steel that won't break. A special brace plate, found in no other Ford emergency brake, prevents buckling so that all braking power possible is used without injury to drum or wheel. Lined with Rusco Brake Lining.

These famous Rusco Products are known and sold everywhere. Write today for complete selling plans and advertising furnished free to dealers.

THE RUSSELL MANUFACTURING COMPANY, MIDDLETOWN, CONN.

PRODUCTS

"Bull Dog"

FOOT ACCELERATOR *for* FORDS

VOLUME SALES PRODUCERS

Turnover—quick sales—produce sales in volume which assure profits in quantity.

Bull Dog Foot Accelerators are quick-turnover accessories. They fit any model Ford and any type of carburetor. No special sizes to carry—no diversified stocks to maintain—no "dead" numbers to hold over.

The price—a dollar and a half—is the biggest inducement to buy. The quality—over a million in use, tells the story. More than three fourths of all the jobbers in the United States and Canada stock them to answer the demand.

How is your stock? The heaviest driving season is at hand. Better arrange for a supply today.

W. H. THOMAS MFG. CO.

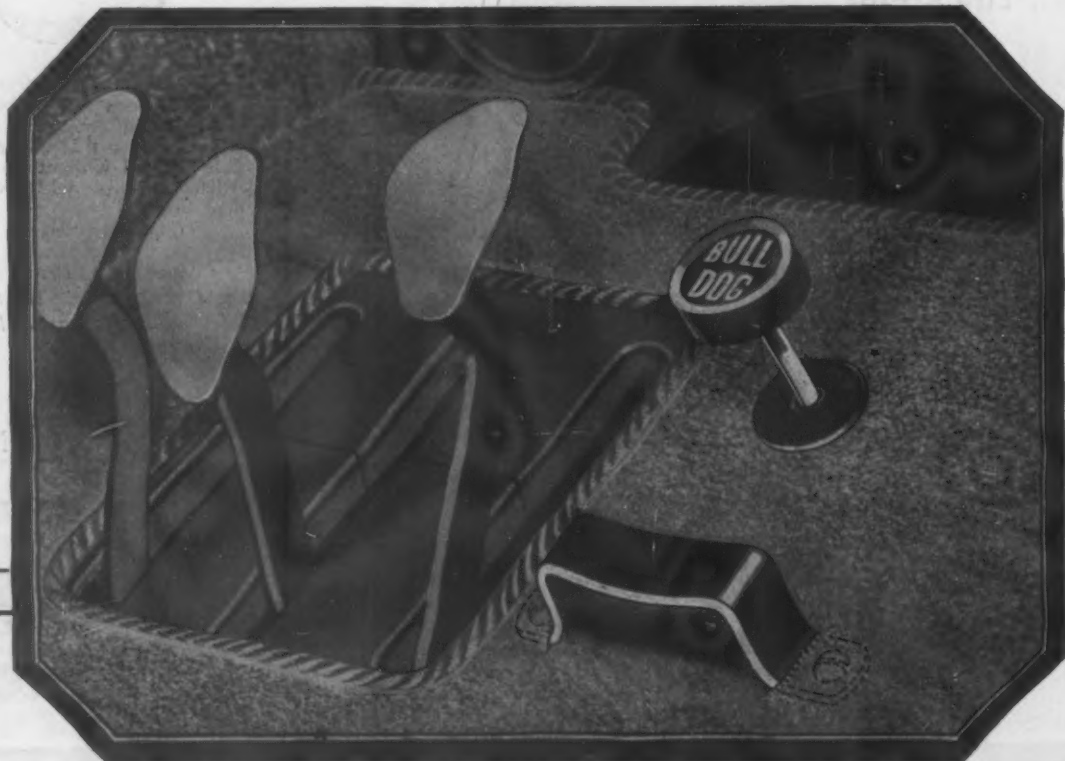
DEPT. A

SPENCER, IOWA

Sales Representatives: The Fulton Company, Milwaukee, Wis.

PRICE ONLY

\$1 50



Built by the Largest Makers of Asbestos Textiles in America



We start with the crude asbestos rock and end with the finished brake lining. We begin at the very beginning and our task is completed only when the lining passes our final inspection. Every process in the manufacture of GARCO Asbestos Brake Lining is under our direct supervision and control. Is it any wonder that—

GARCO

ASBESTOS BRAKE LINING

is preferred by owners who have had opportunity to compare it with other linings? Is it any wonder that jobbers and service men like to sell, or apply this solidly-woven, wear-resisting lining, which gives utmost satisfaction? Specialization in asbestos products plus a great plant are responsible for the phenomenon success of "GARCO."

GENERAL ASBESTOS AND RUBBER COMPANY

Main Offices and Factories:

Charleston, S. C.

Branches:

New York, 296 Broadway. Chicago, 14 North Franklin St. Pittsburgh, 311 Water St.

Asbestos Automobile Specialties

Brake Lining
Transmission Lining for
Fords
Cone Clutch and
Disc Clutch Facings
"RING PAK"
for Ford Piston Rings
Asbestos Spark Plug Yarn
Garco Gasket Roll
Valbestine Valve Stem
Packing
Sheet Packings for
Gaskets
Asbestos Wick and Rope

VELIE SIX

NOW

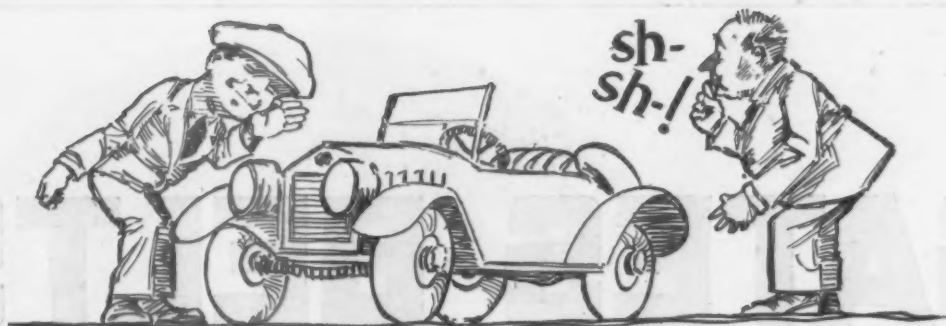
\$1275

The wonderful popularity of the Velie 58 with its Velie Six Vibrationless Motor, and the insistent demand from public and dealer alike, has increased factory production to the extent that makes this astounding low price possible. Every atom of Velie Quality is retained.

DEALERS: The Velie is an old organization, firmly entrenched financially and otherwise. We want good business men as dealers. The Velie Six is a wonderful value. Our contract is liberal; our Finance Plan places cars on your floor and provides for Time Sales. Naturally the Velie franchise is a money-maker. Ask about your territory. We invite correspondence.

VELIE MOTORS CORPORATION

Moline, Illinois



The Less Noise—The More Dollars

QUIETNESS—within the limits of good mechanical practice—is the goal of every car owner. And the shop that can give him back a smooth running, noiseless job, has made a friend for life. One good friend is a fore-runner of a flock of others, too.

Such a job means close fitting. Close fitting means good grinding. Good grinding means a good grinder. And a good grinder means—

A big investment? A lot of room? Wasteful capacity?

Not since Oesterlein came out with its latest and most startling achievement—a new Garage Grinder that fits the capacity, space and finances of every shop in the country: big and little.

No longer is it necessary to surrender big profits to machine shops, or else pay the heavy cost of space wasting factory equipment. The

Oesterlein Garage Grinder will fit into any unused five-foot corner—and do every job with manufacturer's precision. Any workman can turn out the finest kind of finished work on pistons, pins, valves, armatures, etc. It also finds extensive use in the reshaping of all tools used in a garage, as well as miscellaneous jobs.

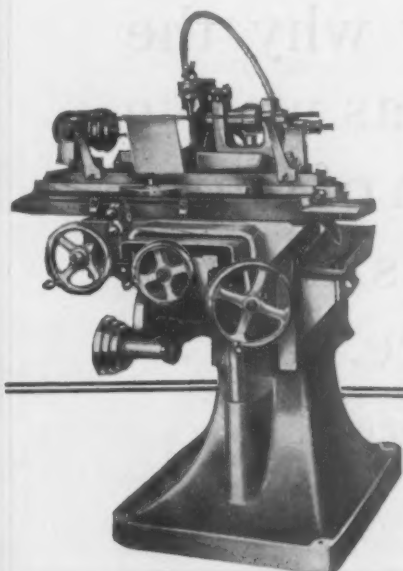
Earns While You Pay

No shop will be denied the opportunity to make the big profits that an Oesterlein Garage Grinder will bring. Not only is its price within reach of all, but it can be secured on terms that enable it to earn its way while you are paying for it.

THE OESTERLEIN MACHINE CO.

Cincinnati,

Ohio



The details of the Oesterlein payment plan are given in the new instructive book, "The Modern Conception of Service," which will be sent free on request. Gives hints of great value on shop practice, and other information useful to the shop owner. Write today for your copy.



OESTERLEIN Garage Grinder

"Earns Money While Building Your Reputation"

GATES BELTS

"The Standardized Fan Belt"



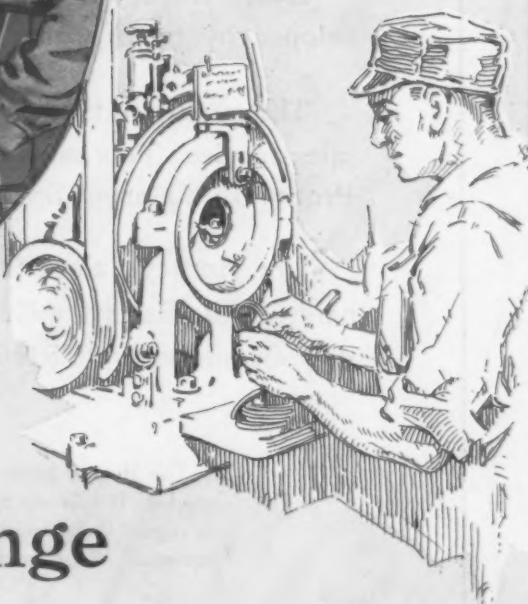
FIG. 1.
Ordinary fan belt.
Threads run lengthwise
and across. To break
this belt on the marked
line only the lengthwise
threads need be broken.



FIG. 2.
Gates Vulco Belt.
Threads run diagonally.
To break this belt every
thread must be broken.
This bias weave con-
struction is patented.

These simple drawings show clearly why the patented bias weave construction of Gates Vulco Belts means double service.

Made by the World's Largest
Manufacturers of Fan Belts.



The Quality which does not change

IN all parts of the country the demand for American Hammered Piston Rings is greater than ever before.

Day and night shifts in our factory have been made absolutely necessary to keep production apace with orders.

American Hammered rings,

at the new factory list price of 60c for usual motor car sizes, are individually cast, accurately machined and hammered—the same rings chosen and used by 150 motor and industrial engine builders for factory equipment.

Theirs is a quality which does not change. Ask your jobber.

New Factory
List Prices

60c

Up to 4 1/8
inches

Special for
Ford Type

50c

No extra charge
for overseas

American Hammered Piston Rings

AMERICAN HAMMERED PISTON RING COMPANY, Baltimore, Md.
Export Department, 461 Eighth Avenue, New York, U. S. A.



Maximum Profit Minimum Investment

Every Harvey Dealer shares in the Harvey profit opportunities developed by twenty years of quality production and fair play.

The quality of Harvey Springs eliminates the necessity for after-sales-service. This same quality assures satisfaction to your customers. Profits from Harvey Springs are, therefore, permanent.

The Harvey Sales Plan, backed by a National Advertising Campaign in the Saturday Evening Post, assures the one other factor vital to your success, TURNOVER.

The Harvey turn-over policy absolutely protects you against dead stocks. If you are not a Harvey dealer, let us give you all the facts in regard to becoming identified with this foremost line of automobile springs. Write today.

HARVEY SPRING & FORGING COMPANY, Dept. 14, Racine, Wis.

Boltless
Automobile
Springs
For All Cars



A New and Better Car

\$400 less

We announce a substantial
reduction in the price of the

HUFFMAN

"Light Six"

New Price Touring or Roadster \$1395

Without question, the Huffman at
this price, is a valuable account for any
dealer. Write us and we'll explain why.

HUFFMAN BROS MOTOR CO
ELKHART IND.

Huffman Trucks also reduced
Model C-#1695 — Model B-#1795

Gier Tuarc STEEL WHEELS

—a Motor Wheel Product

Motor Wheel
PRODUCTS



TWENTY years of large scale wheel building experience guides the design and construction of Gier Tuarc Steel Wheels. Naturally they embody not only the inherent strength of steel, and extreme beauty, but also every improvement and convenience known to wheel building science.

Direct outside valve stems were first made possible in steel wheels by the original Tuarc design — the handsome double curve, with disc and rim-felloe in one piece for permanent quiet and true running.

The standard demountable rims used with Tuarc Wheels make tire changing as easy as possible; require no new tire carrier and eliminate excess weight in carrying spares, there being no extra wheel. Added economy lies in the fact that Tuarcs are installed without a single change in the hub.

These practical advantages, as well as fine appearance, have created the present unmistakable preference for Gier Tuarc Steel Wheels.

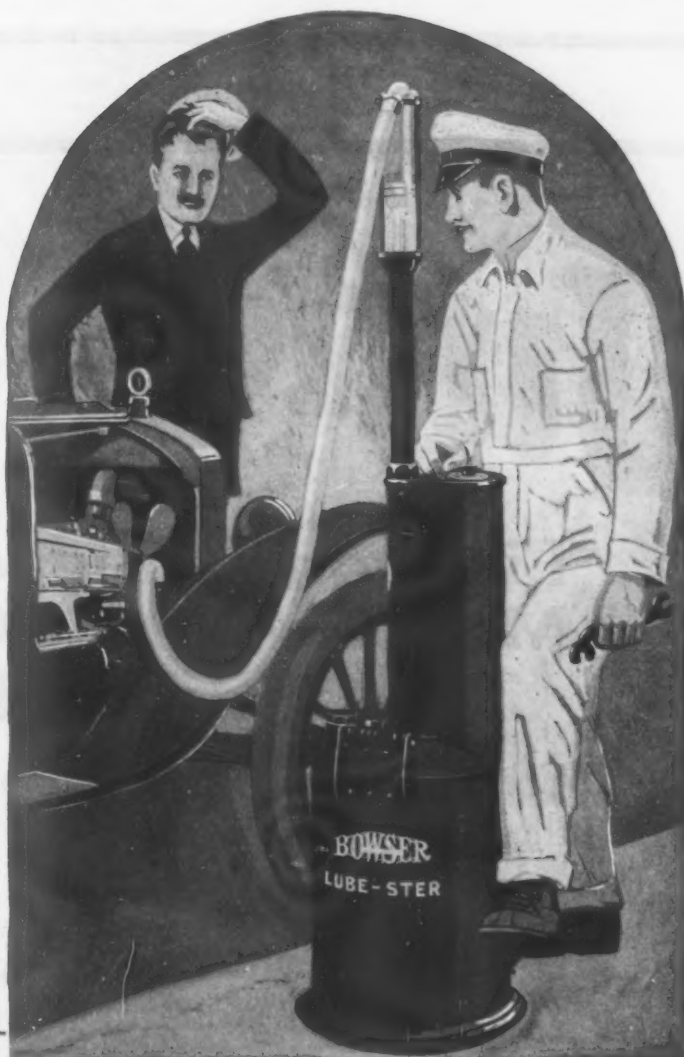
MOTOR WHEEL CORPORATION, LANSING, MICHIGAN

Motor Vehicle Wheels Complete—Metal Stampings—Steel Products

509 Fisk Bldg., Broadway at 57th, New York
584 Commonwealth Ave., Boston
10 South 18th St., Philadelphia

601 Capitol Theatre Bldg.
120 Madison Ave., Detroit

Bigelow Blvd. & Craig, Pittsburg
520 Van Ness Ave., San Francisco
1341 So. Hope St., Los Angeles



The LUBE-STER

Bowser Products For Handling Gasoline and Oils Wherever Sold or Used

Filling Station Pumps
and Tanks for Gas-
oline.

Portable Tanks for Oil
and Gasoline.

Storage and Measuring
Outfits for Paint Oils,
Kerosene and Lubri-
cating Oils.

Carload Oil Storage
Tanks.

Power Pumps.

Dry Cleaners' Under-
ground NapthaClari-
fying Systems.

Richardson-Phenix Oil
Circulating and Fil-
tering Systems and
Force Feed Lubri-
cators.

Write for Booklet

The Bowser Lube-ster was placed on the market only a few short weeks ago. Already its popularity has spread nation-wide. It is the only outfit of its kind—quick, economical, yielding big profits and able to more than pay for itself the first year.

With the Lube-ster you serve a quart of oil in 10 seconds and by foot power, no elbow grease required! Your customer sees the quality of the oil through the glass cylinder which constantly invites the trade of passing automobilists. A tally bell announces the completion of each measurement. Measure and funnel methods, slow inaccurate, untidy—all making for dissatisfied customers, need no longer be put up with.

The demand for this outfit, increased by advertising in the Saturday Evening Post, Literary Digest and the automotive publications, makes it hard to ship outfits as fast as orders are received.

Write today for Booklet A-14 fully describing this wonderful "salesman at the curb," and find out how quickly you can step on the Lube-ster profit pedal.

S. F. BOWSER & COMPANY, Inc.

Pioneer Manufacturers of Self-Measuring Pumps

Home Plant: Fort Wayne, Indiana

Canadian Plant: Toronto, Ontario

Factories and Warehouses: Albany, Dallas, Milwaukee, San Francisco, Sydney.
District and Sales Offices: Albany, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Columbus, Dallas, Denver,
Detroit, Kansas City, Los Angeles, Minneapolis, New York, Oklahoma City, Philadelphia, Pittsburgh,
Portland, St. Louis, San Francisco, Toronto, Washington Representatives Everywhere.

Branch Offices with Service Departments in Principal Cities in this Country and Abroad.

BOWSER

ESTABLISHED 1885

ACCURATE MEASURING PUMPS

June~

Firestone's Biggest Month—700,000 Tires Shipped!

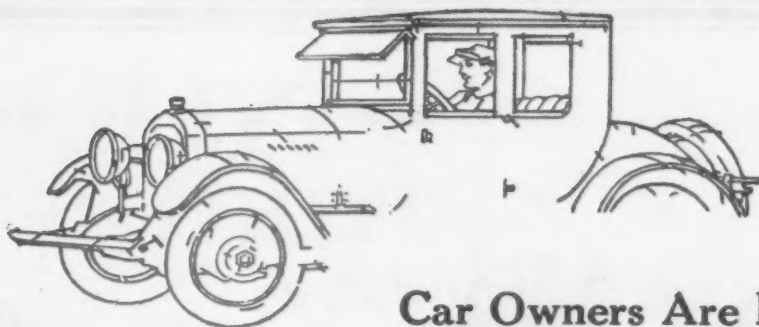
Convincing public recognition of the new standard of service and value in Firestone Tires.

Dealers everywhere are taking advantage of Firestone quality and merchandising methods, together with the unchallenged record of Most Miles per Dollar, and are obtaining an increasing portion of the tire business in their territory.

Most Miles per Dollar

Firestone

GUM-DIPPED CORDS



Car Owners Are Buying on the Basis of Service Per Dollar Expended

Back of the average automobile buyer is an increasing mechanical knowledge. Experience has made him better acquainted with the relative value of cars and he judges values in the light of growing experience when he selects a new car.

To comply with the requirements of this average buyer in the broad market, the car must show a measure of economy beyond that acceptable in the past; it must be economical of oil, gasoline and tires; it must be simple, yet flexible and powerful; it must entail the minimum expenditure for upkeep and maintenance; it must return full service for every dollar invested, and it must fall in the moderate price range.

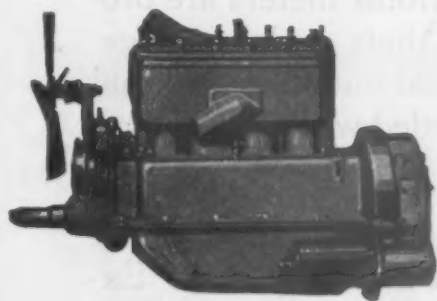
The logical result is shown in the increasing popularity of the "Four."

The car manufacturer who sells to this average buyer in the really big market finds in the Lycoming Motor the ideal engine with which to power his car.

Powerful, yet economical; simple and compact, it brings to him the solution to his changed marketing problem. It has a record of performance that accounts for the fact that so many owners of Lycoming equipped cars repeatedly buy the same make of car.

This is perhaps due to the fact that back of the Lycoming Motor is the largest organization devoted exclusively to the manufacture of four-cylinder engines.

Some of the reasons for this will be apparent if you write for specifications.

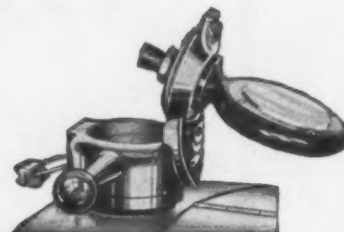
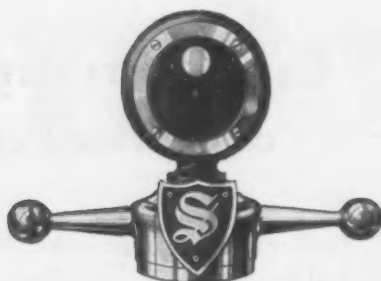
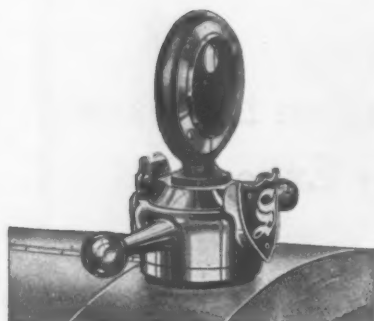


LYCOMING MOTORS CORPORATION

Williamsport, Pennsylvania

Lycoming

MOTORS



SCREWS ON—BUT NOT OFF



Screwing the Monogram cap into place locks it permanently. Yet, if radiator repairs are necessary, it comes off in a jiffy, simply by turning the radiator upside down.

There are no keys to lose, forget or bother with. Motor meters are protected against theft and breakage. Owner's personal initial or fraternal emblem is included with each cap.

These are only a few of the features that have made Monogram caps the talk of the trade and the public. Experience *proves* that Monogram caps bring quick and easy sales, worth while profits and satisfied customers. Write your jobber now.

General Automotive Corp.
 625 W. Jackson Blvd., Chicago, Illinois

Tourists Tourists Everywhere Buy Monkey Grip

Each Needs This Handy Tire Patch Kit

Nine million motor cars of this country will be taking a trip somewhere this summer. Over mountains and desert; through woods and hills; to the lakes or seashore; cars are swarming everywhere. Would you think of touring without a life-saver for tire trouble in your tool box? Neither would the millions of tourists who are everywhere. A Can of genuine Monkey Grip Tire Patch is an absolute touring necessity.

Cash Sales, Fast and Furious, If You Give 'em the Genuine.

The Saturday Evening Post and a big group of farm papers carry Monkey Grip advertising to over four million motorists monthly. They will want the genuine. Get your shelves well stocked at once. Get the benefit of this big demand. Cash sales quickly and easily made; and the profit is liberal. Order from your jobber today, or if he hasn't the genuine, write us for dealers' prices and terms.

MONKEY GRIP RUBBER COMPANY
Ft. Worth, Texas Oklahoma City, Okla.

OTHER MONKEY GRIP PRODUCTS

Monkey Grip Rubber cement in separate tubes is a popular seller. Monkey Grip Gasket Shellac and Radiator Seal turn rapidly and offer extra liberal margins. Monkey Grip Tires and Tubes will be ready soon and they will be a sensation.



What Happens After 4 or 5 Years

Your old Brunner—with a few adjustments—will be better than any new machine you can buy.

ALL Brunner parts are standardized. And they are made with extreme care and skill. They fit exactly—always.

Well-fitted parts wear longer—of course. They run more smoothly and efficiently. They wear evenly.

And when they do wear down to an extent that makes adjustments advisable—the Brunner ground surfaces, perfect alignments due to careful gaging and special jigs and fixtures, the highest grade of special castings carefully selected and admitting of rebuilding to several oversizes—give the Brunner owner at small cost a renewed machine that is as good as new.

No wonder so few second-hand Brunners are obtainable. Their owners will not sell them—at any price much less than the cost of a new machine!

Write us for a free copy of the "Air Compressor Handbook" and know exactly what sort of compressor will best fill your needs.

BRUNNER MFG. COMPANY

Oldest and Largest Manufacturers of Air Compressors in the World

UTICA, NEW YORK

Sales Offices: Utica, Cincinnati, Kansas City, San Francisco and nearly every jobber from Maine to California

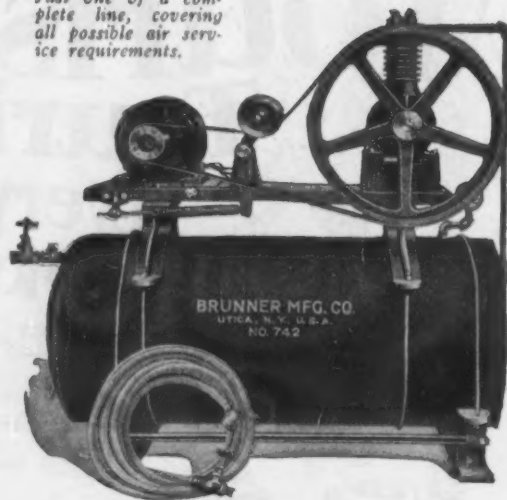
Brunners Are No Higher Priced

Quantity production permits pricing Brunner Quality Compressors at same figures as any ordinary compressor of similar capacity.

Ask for Your Copy of This Book

A very interesting 24-page book on the Principles and Methods of Air Compression will be mailed to you upon request.

Just one of a complete line, covering all possible air service requirements.



Where Every Brunner Excels

1. All running surfaces and bearings *ground*.
2. Evenly *balanced* piston loads.
3. Any model can be rebuilt to *several oversizes*.
4. Easy replacement with *standardized* parts.
5. Valves and fittings *non-corroding* brass.
6. Absence of *vibration, noise, or loose joints*.
7. A Brunner lasts for *twenty* years and more.

BRUNNER

BRUNNER

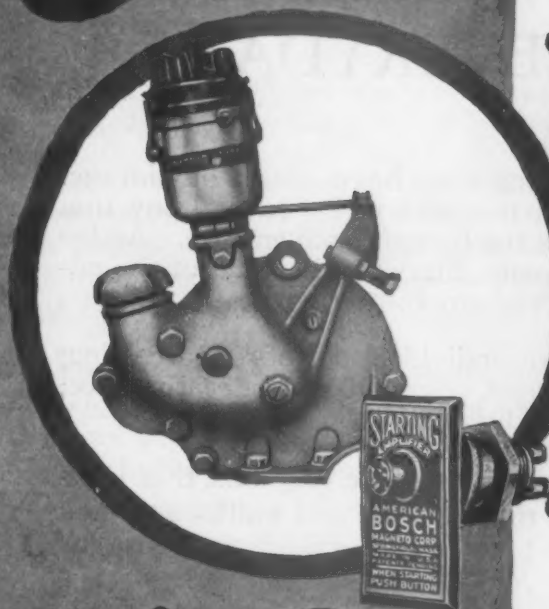
AIR COMPRESSORS

New! New!

BOSCH

FOR

FORDS



\$19

Complete

**Battery
Ignition
System**

and

**Starting
Amplifier**



Here's big news for Ford owners and the trade—

A complete Bosch Ignition System, and the new Bosch Starting Amplifier—at \$19.00.

Both are made especially for Fords by the makers of the world famous Bosch Magneto—both are guaranteed to give the same dependable service as all other Bosch Products.

Think of the sales opportunities—the tremendous demand this announcement will bring—

Ford owners everywhere will insist on Bosch when they find it can be had at the same price as inferior systems.

The Bosch Starting Amplifier assures positive starts every time.

The Bosch System for Fords, including the Starting Amplifier, the Bosch Compensating Timer-Distributor, cables, etc., for use with one Ford Coil (three in reserve) is sold complete at \$19.00.

With the well known, waterproof, single unit Bosch Coil—\$8.00 extra.

Wire or write for particulars.

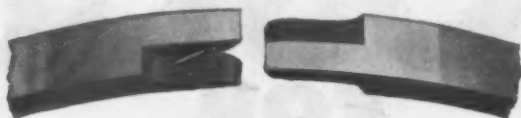
AMERICAN BOSCH MAGNETO CORPORATION

Main Office and Works: Springfield, Mass.

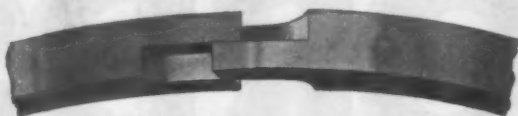
Branches: New York, Chicago, Detroit, San Francisco
Over 500 Service Stations in 500 Centers

The Master Lock Joint Creates Advantages That Are Exclusively EVERYDAY'S

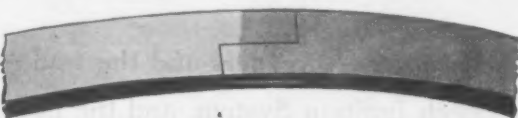
Patented March 23, 1915



THE EVERYDAY MASTER LOCK JOINT locks the ring EDGEWISE and WIDTHWISE—just like a solid ring. It expands to fit worn walls—but it still maintains its solid joint.



THE EVERYDAY MASTER LOCK JOINT expanded—it is still just like a solid ring! By reason of this expansion standard size rings fit many oversize requirements.



Solidly locked, EDGEWISE and WIDTHWISE. Positively overcomes joint leakage—it saves gas and oil and builds power. The solid locked joint seals the ring.



QUICK SEATING TURNED FACE. Fine lathe turning produces a velvet face that will seat faster.

*Sold exclusively through jobbers everywhere
Resold by leading dealers*

List Prices:

up to 4" .50, 4" to 4½" .60,
4½" to 5" .70

Sizes:

2" and up, ranging in 1-16";
oversizes in .010; .020; .030

ANY ring may have some advantage. But nowhere will you find any ring that has the *Everyday* advantages. And—what's more, *Everydays* have all of the advantages of any other ring.

One-piece, individual out-of-round casting; lathe turned, velvet finish, fast seating face; and in addition these exclusive advantages—

- the *only* one-piece ring joint that locks the ring edgewise and widthwise. You can't force gas—oil—power past it. *No joint leakage.*
- the *only* ring that maintains an even and constant spring tension no matter how worn the walls. As the walls wear the *Everyday Master Lock Joint* automatically expands, allowing the ring to fit the new diameter—yet the joint is still solidly locked.
- the *only* piston ring that can be installed in less time than ordinarily required for such work. *No filing or tedious adjustments.*

Moreover, the advantage of the *Everyday Master Lock Joint*—thru its greater expansion—actually reduces by one-half the necessity for oversize rings. Think what this means to you. Less stock to burden your counter—less of your money invested—and yet you can fill every piston ring requirement put up to you.

All these big advantages mean much to you. They mean more sales and more satisfied customers. And—there are "extra" profits in our selling plan—so there's nothing else needed but your request, "Send me full information."

EVERYDAY PISTON RING CO. INC.

EAST ROCHESTER, N.Y.

Does the Ford owner deserve to be told?

Suppose the Ford owner, in general, fully understood the fact that every Ford cylinder being made today is fired by a wholly new type and design of spark-plug.

Suppose every Ford owner realized that the old half-inch standard type of plug was discarded in favor of the new extension type—originally furnished by Bethlehem to Ford for standard equipment—and listed as Ford Part 5200.

And then suppose the Ford owner got it into his head that an extension type of spark-plug was standardized by the Ford people because its merits were those supreme merits which proved themselves in MILLIONS of spark-plugs by delivering absolute service to the Ford owner. . .

If every Ford owner were TOLD these truths; and told, besides, how and why the Bethlehem policy put spark-plug selling on a four-square basis. . .

Don't you KNOW there's enough fair play in the American make-up to back up such a plug and such a policy?

Well

is the jobber going to tell all that to the retailer? And will the retailer tell it to the car owner?

Or shall the jobber, and the retailer, and Bethlehem, all do the telling all together?

Because the Ford owner is sure going to be told!

When he is told, perhaps more surprising things may overtake the spark-plug business than already have this year.

What things? Why, write to me and I'll give you an idea what things.

C. H. Schwab
President.

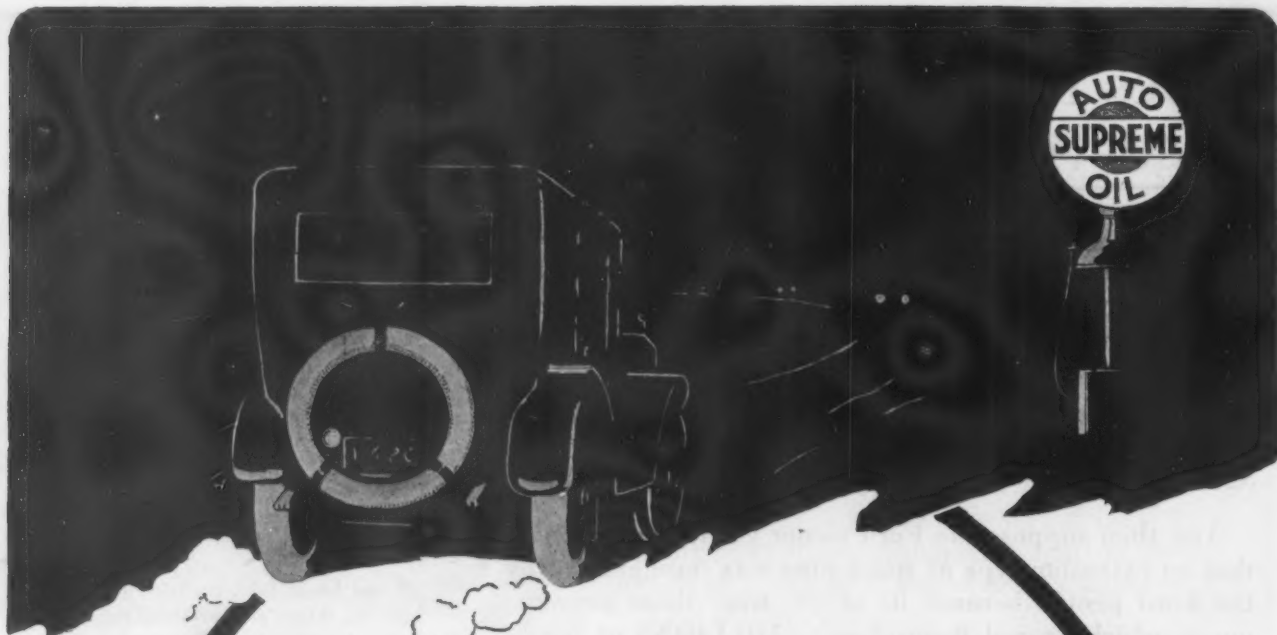
BETHLEHEM SPARK PLUG CO.

Bethlehem

Pennsylvania



THIS PICTURE shows the Bethlehem No. 8—Special for Fords—of which nearly FIVE MILLION have been equipped to Ford cars, Ford Trucks and Fordson Tractors. There is no spark-plug better for Fords of any model.



At the Sign of the Orange Disc

Get and keep your customers
with "GULF" products



GULF REFINING COMPANY
FRICK BUILDING ANNEX PITTSBURGH, PA.



They Threw Out the Brands Their Competitors Were Carrying— Then They Began to Make Money

*On a new tire with distinctive selling features, they
built up a permanent volume of business in one year*

"We feel that we have made a remarkable showing with our new franchise. In twelve months we have done more than \$40,000 business on this one tire," writes Mr. Whitaker of the Doherty Hardware Co., Ltd., Baton Rouge, La.

"The secret of our success is simply that we have a product with real selling advantages. In the old days we were trying to sell tires which every other dealer and distributor in this territory also stocked. If we sold a customer one of the ordinary brands, he was just as apt to go to some other dealer in town when he needed his next tire.

"With the Thermoid Tire a man comes

back to us when he wants another tire and we are thus able to cash in on every repeat sale.

"We distribute these tires through about twenty-five dealers within a radius of 150 miles of this city. Every one of them is an enthusiastic Thermoid booster. In our own organization our entire personnel, from the President down to the office boy, is sold on Thermoid Tires."

Stories such as that of the Doherty Hardware Co., Ltd., told above, are coming in from dealers and distributors all over the country. On all kinds of roads, under all sorts of conditions, Thermoid Tires are setting new mileage standards.

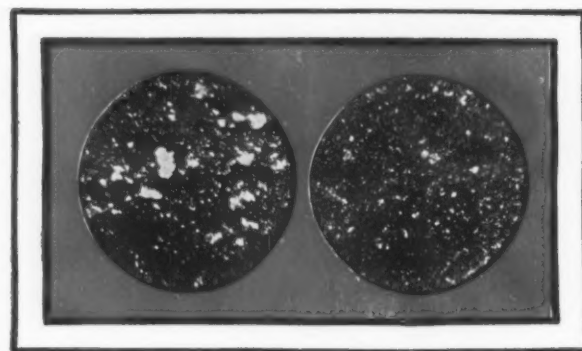
The two illustrations opposite show clearly just what Crolide Compound means in producing more even-textured, longer wearing rubber for tires. The selected materials used in Crolide Compound Rubber are so blended and compounded as practically to eliminate the "lumpy" formations that exist in ordinary tires.

Blowouts, ply separation, tread separation, rimcutting—all the most serious defects in ordinary tires are reduced to a minimum in Thermoid Tires.

What the Thermoid Selling Plan Offers

For some years there has been widespread dissatisfaction with tire profits among dealers and distributors. Small discounts, no protection in your territory, slow repeat sales, no exclusive selling points—these have been the evils.

To help dealers and jobbers to greater profits and repeat sales, to give free play to their sales ability, to reward them properly



Actual photographs of rubber magnified 200 times

Ordinary tire rubber
The white areas are "lumps" of foreign substances that have not mixed in evenly. Every "lump" is a weak spot that reduces mileage.

Crolide Compound Rubber
has no large "lumps." Notice how finely divided the particles are. This even texture is what makes Thermoid Tires wear so long.

for their sales effort, the manufacturers of Thermoid Tires offer a real selling proposition:

1. A tire with distinctive selling features.
2. List prices that are right; adjustments on a long mileage basis.
3. Exclusive sales territories to distributors with the proper qualifications.
4. A discount that properly compensates the distributor for selling as well as distributing.
5. A sales asset in the prestige of the Thermoid Rubber Company, whose name and reputation are known to the trade and motoring public everywhere, as a result of extensive national advertising of quality products for more than ten years.
6. Intensive consumer advertising and sales co-operation by the Thermoid Rubber Company within the territories of the distributors.

Complete information and name of nearest distributor will be sent to any dealer upon request. A few good territories are still open for high-grade distributors.

THERMOID RUBBER COMPANY

Factory and Main Offices: Trenton, N. J.

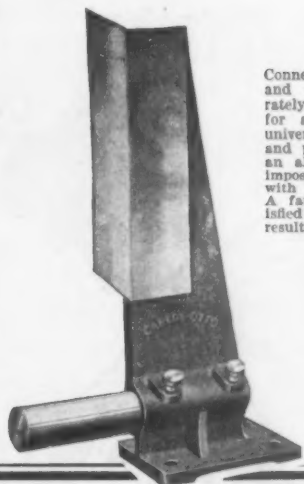
New York, Chicago, Los Angeles, Seattle, Detroit, Atlanta, Boston, Cleveland, London, Paris, Turin



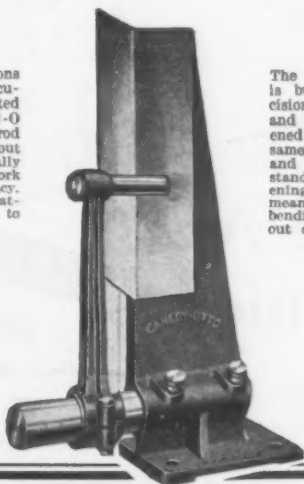
Made of Crolide Compound Rubber, every Thermoid Tire, whether Cord or Fabric, is even textured. This is why it can be said to be equal to its oversize in any ordinary make.

Thermoid TIRES

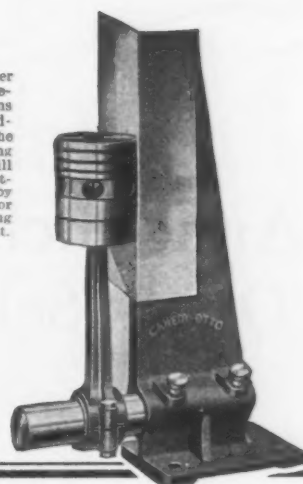
Crolide Compound Rubber Gives Extra Wear



Connecting rods, pistons and piston pins are accurately and quickly tested for alignment by the C-O universal connecting rod and piston aligner. Without an aligner, it is practically impossible to do this work with any degree of accuracy. A faulty job and a dissatisfied customer are sure to result.



The C-O universal aligner is built to the finest precision standards, with pins and bearings that are hardened and ground. At the same time, it is so strong and sturdy that it will stand the twist of straightening a connecting rod by means of a large wrench or bending bar without going out of line in the slightest.



CANEDY-OTTO

**"The
Well Equipped
Shop
Gets the
Business"**

You do better, faster work with C-O equipment. This means time and labor saved on every job. You make more money and your customers are better satisfied.

You gain trade, because car owners appreciate the well equipped shop. They know they will get better work, in less time, and with fewer "alibis."

When you use C-O equipment, you are getting the best there is. Each unit is the result of practical shop experience, tested, proved and tried.

Throughout our fifty years of manufacturing experience, we have led in the design and manufacture of shop equipment. Today C-O equipment is more widely preferred than ever.

Send for a free copy of our catalog showing you how to make money by cutting time and labor costs. Do it today. Start now using C-O methods for making bigger, better profit.

Address Dept. A

CANEDY-OTTO MANUFACTURING CO.

Manufacturers of Automotive Equipment, Drills, Punches, Shears, Shrinkers, Countershafts, Grinders, Buffers, Forges, Blowers, Tugger Irons and Blast Gates.

**Main Office and Factory, Chicago Heights, Ill.
New York Office—Grand Central Palace**

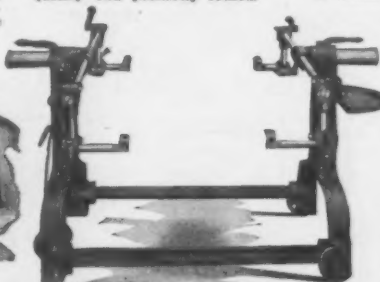
For quick, heavy lifting, our No. 0 Portable Crane is ideal. It turns in its own width, and reaches the center of any car or truck. The base passes under all axles. Safety is assured by the special casters, automatically locking the crane when standing.



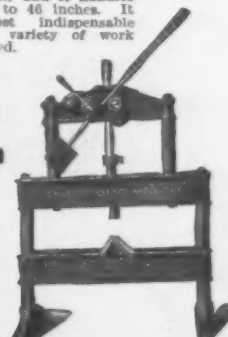
Thousands of shops are using the C-O Universal Burning-In Machine with profit and satisfaction. Perfect bearings are secured in but a fraction of the time required by hand methods. The machine is quickly and easily set to fit any kind of motor. It is the one machine that no modern equipped shop should be without.



No extra attachments are required for the C-O Universal Motor Stand. It will hold any motor in any position for assembling and disassembling, and balance it perfectly. The adjustments slide easily and are quickly and positively locked.



No job is too big or small for the C-O No. 7 Arbor Press. Its capacity is 30 tons, and it handles work up to 46 inches. It is almost indispensable where a variety of work is handled.



Announcing the AC Quick Seller Junior

Now there is an AC Quick Seller for every dealer who wants to make the most of his spark plug trade. Since the first Quick Sellers were put to work, live merchants everywhere have found quicker and greater profits from plug sales.

The Junior Quick Seller differs from the regular model (holding 140 spark plugs) in size only. This model holds an assortment of 50 AC Plugs. It is a neat, attractive counter cabinet that reminds every customer of AC Spark Plugs.

The Quick Seller keeps a perpetual check on spark plug stock, enabling you to see at a glance what plugs you need. And you can sell AC's to all motorists, for there are specially designed AC Plugs for every make and model engine.

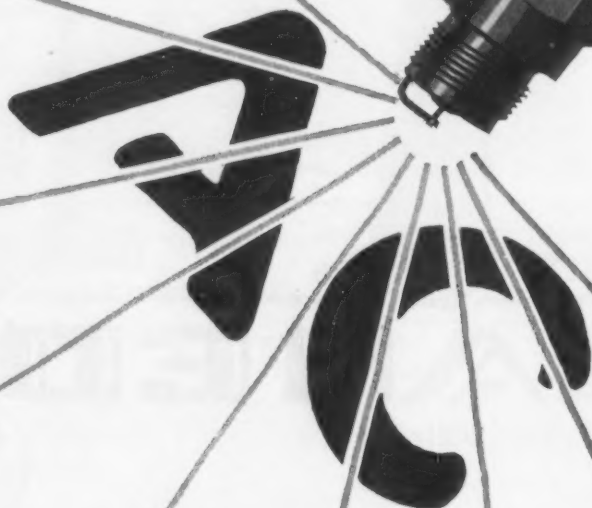
Its handsome lithographed lettering immediately ties up with AC's strong advertising. It identifies your store as the store of a "good dealer," to whom AC advertising is constantly sending motorists for AC Plugs. Both AC Quick Sellers carry a chart showing the correct AC Plugs for every motor.

Ask your jobber's salesman, or write us direct, about the regular Quick Seller, or the new Junior model.

AC Spark Plug Company, FLINT, Michigan

U. S. Pat. No. 1,135,727, April 12, 1915, U. S. Pat. No. 1,316,189, Feb. 12, 1917. Other Patents Pending

*The Standard Spark
Plug of the World*



Sell the AC 1075 Plug to all Ford owners. It has the patented AC Carbon Proof porcelain and other exclusive features. You can sell complete sets of AC's to the Ford owner who comes in for a single plug

First and Only Two Stage — — — Air Compressor With a Copper Intercooler

CURTIS Compressors are the original and exclusive development of the Curtis engineering staff, guided by advanced principles of design, and experience gained through 69 years of manufacturing, over 26 of which have been devoted to pneumatic machinery.

Curtis Single and Two-Stage Compressors

Curtis Single-Stage Compressors have controlled splash oiling system—run 10 to 15 times as long on the same amount of oil. Fan flywheel aids in keeping cylinder cool. Hand unloader prevents blowing fuses and jumping belt. Head removable without loosening pipe connection. Many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have same features that established our single-stage so strongly. Exclusive aeroplane-type copper intercooler with thin radiating fins rigidly attached, assures fullest advantage of two-stage compression. Vertical type, providing a truly balanced design with a uniform load on the crankshaft—assuring less strain, vibration and wear. Several styles, four capacities. Write us for full particulars. Use Coupon, or a postal will do.

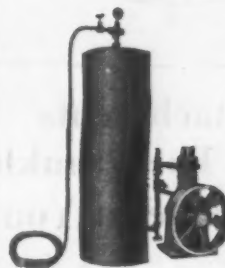
Curtis Pneumatic Machinery Co.

1527 Kienlen Ave., St. Louis, Mo.

Branch Office: 530-H. Hudson Terminal,
New York City

Canadian Representative: Joseph St. Mars,
Winnipeg and Toronto, Canada.

"An Original Design"

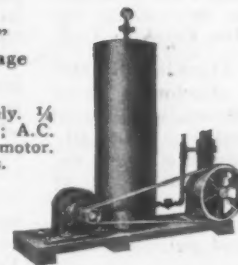


Style "S"
Single-Stage
Outfit

Belted only.
Five sizes, $\frac{1}{4}$ to
3 H.P. Complete less driving power. If you already have power, this is an ideal outfit.

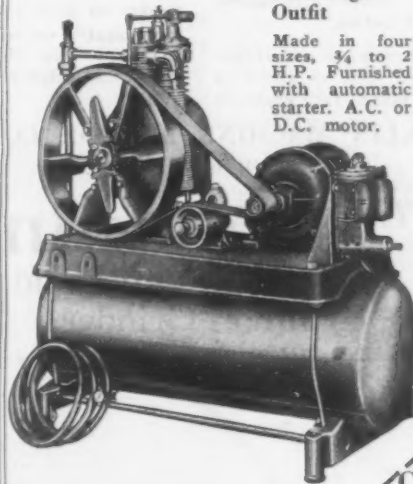
Style "Z"
Single-Stage
Outfit

Belted only. $\frac{1}{4}$
to 3 H.P.; A.C.
or D.C. motor.
Five sizes.



Style "V"
Two-Stage
Outfit

Made in four
sizes, $\frac{3}{4}$ to 2
H.P. Furnished
with automatic
starter. A.C. or
D.C. motor.



Send
Coupon

Curtis
Pneumatic
Machinery Co.
1527 Kienlen Avenue
St. Louis, Mo.

Gentlemen:

Please send me full details on Curtis Air Compressors, your proposition and prices.

Name.....

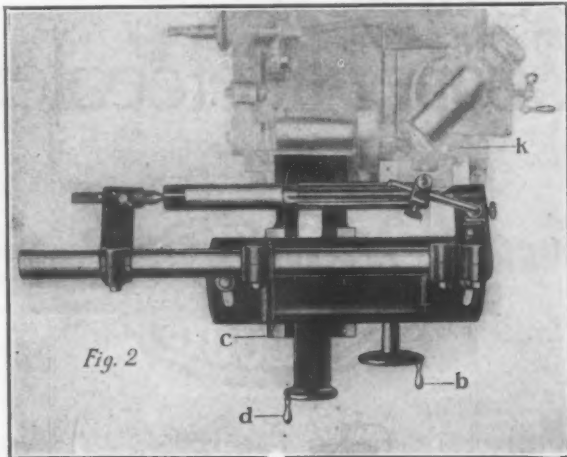
Address.....

Jobber's Name.....

Address.....

CURTIS *Single and Two Stage* Air Compressors

A LITTLE MACHINE SHOP, SELF-CONTAINED



Two More Attachments That Make The Franklin Indispensable in Your Shop

Some garages pay three times as much for a reamer grinder as they would for the complete Franklin Tool.

Yet the Franklin Reamer Grinding attachment alone (shown above), will handle with facility practically every reamer that enters the shop—taking the place of large expensive machinery that often requires overhead shafting and pulleys.

And that's only ONE of the features. Another is the Flexible Shaft Attachment indicated below.

When there's an out-of-the-way hard spot to grind—a welded point for example

—it's a simple matter to place the small emery wheel in position, and start work.

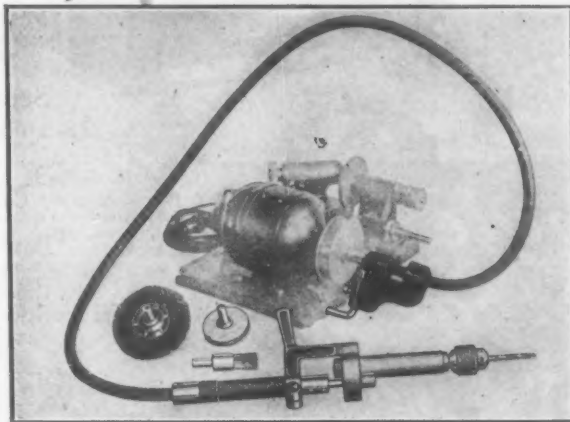
This attachment also includes a rotary steel wire brush for removing carbon from valves, and a portable wheel brush for removing rust and scratching up surfaces on various jobs.

You should know the other interesting features of this remarkable valve grinder. Your jobber can tell you all about it — how quickly it pays for itself and puts profits in your pocket.

Investigate—we will be glad to send you details and name the distributor nearest you.

FRANKLIN MACHINE & TOOL COMPANY
Springfield, Mass.

The Franklin Universal Valve and Cutter Grinder



BETTER REPAIR JOBS

with



PISTON PINS



Because of unusual manufacturing care to produce the best piston pin that can be made.

Easier to fit in regrounding jobs because of exact machining and grinding.

More satisfactory to owners because extra hard and tough. Machined from solid steel. Heat treated by B-N perfected process.

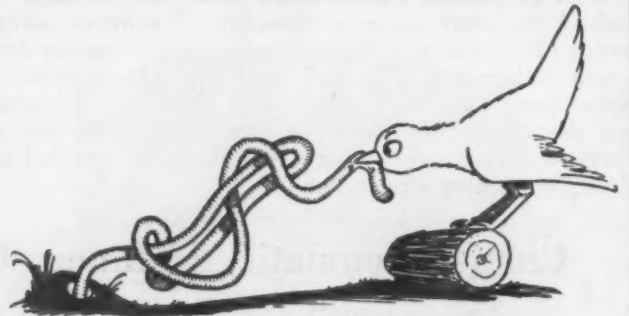
Complete stocks at all important centers.

24 HOUR SERVICE

Write for List of Jobbers

BURGESS-NORTON MFG. CO.,

532 Peyton Street, GENEVA, ILL.



Will You Be the Early Bird?

The early bird, the battery assembler who is using Champion Plates, is the fellow who is doing the business in his territory. He's making better batteries: hence he's making more money.

If you aren't using Champions now, you owe it to your customers to send that order in right away. We can't tell you just how good they are. You'll have to give them your own test.



Write today. Remember the early bird.

Champion Storage Battery Co.

Pittsburgh, Pa.

PATRIOT

Motor ★ ★

★ ★ Trucks

Low Upkeep Sells Them and Keeps Them Sold

"In 1920 we bought our first Patriot, a Lincoln model on pneumatic tires. It proved to be so satisfactory and profitable that in 1921 we bought another of the same model.

"We like the Patriot trucks because they are a real honest-to-goodness truck and not a plaything. The repair bill for both machines, has been \$2.95—two dollars for a spring leaf, fifty cents for vulcanizing tube, twenty cents for a magneto spring and twenty-five cents for a grease cup.

"Truck No. 1 has run about 15,000 miles. What would the repair bill be on a wagon that had made 15,000 miles over all kinds of roads?

"Yours very truly,

"ADAMS ALFALFA FARMS,
E. R. Adams,
Seward, Okla."

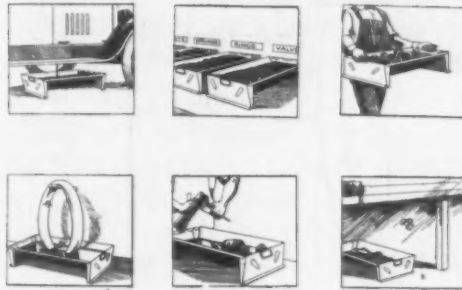


This is one of the two trucks that made such a remarkable upkeep record. Yet that record is not an unusual one for Patriots to make. Such performance is the best guarantee of stability for the business of a man selling Patriots.

Become one of the prosperous men who have founded their business on the sound merchandise we make and the goodwill of the men who buy it. Our contract assures permanence. Investigate this opportunity.

Patriot Manufacturing Company
Havelock, Nebraska

HANDI-PAN



Has Plenty of Uses— Withstands Abuses

\$
2⁰⁰

The illustrations above show only a few of the things it will do better than the way they're being done in most shops now.

Handi-Pan is a stayer. When the average pail or dish-pan has gone to the alley for keeps, Handi-Pan is just getting into its work. It's made of heavy gauge galvanized steel, the body of one piece, the ends fastened on so they can't get loose. The handles are big enough to admit a gloved hand. Handi-Pan is twenty-four inches long, twelve wide at the top and five and a half deep. Its capacity is 4 gallons. It weighs twelve pounds. A husky man can stand on one edge without tipping it over or bending it.

At the low price we quote, Handi-Pan should pay for itself in convenience and saved time in a couple of months. We allow regular discounts to the automotive trade. We'll return your money if you don't like Handi-Pan, but the chances are you'll order a half dozen R-U-S-H. Send a check now.

Sales Department

**STANDARD MOTOR
PARTS CO.**

1420 S. Michigan Ave.
Chicago

Manufactured by

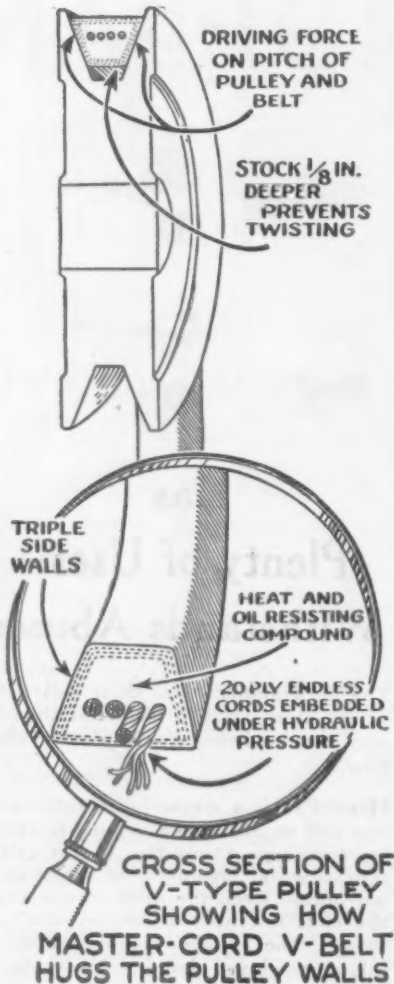
ROBERTSON BROS. MFG. CO.

5401 S. Western Blvd., Chicago, Ill.



MASTER-CORD

Moulded V-Belts



6 Points of Quality

1. Non-Stretchable

Four endless, 20-ply cords imbedded in pliable compound prevent stretching.

2. Do Not Twist

Made to fit deep into pulley so belt cannot twist and turn.

3. Pliable

A special elastic compound is moulded under pressure. A firm grip and smooth running are the results.

4. Perfect Traction

Each belt is built to fit perfectly the pitch of the pulley on each separate motor.

5. Moulded Numbers

Prevent Mistakes. The stock number is moulded on the side of each belt. The first two figures give width in eighths, the last two give length in inches.

6. Good Service

Endless cords sealed in oil- and heat-resisting compound, with triple side walls (where wear comes) means unusually long and satisfactory service.

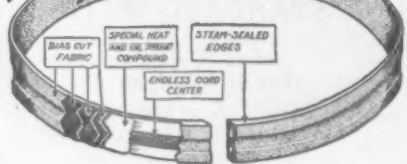
To secure volume sales we give unsurpassed quality and are willing to take smaller profits. That's why our list prices are surprisingly low and your profits are pleasingly large. For instance, note this example:

Chevrolet 490 "V" Type Belt—List Price \$1.35

(Our No. 5832)

Ask your jobber at once about this quick selling, profitable line of guaranteed quality fan belts.

MASTER-CORD



MASTER-CORD BELT CO.

Denver, Colorado

Flat Type

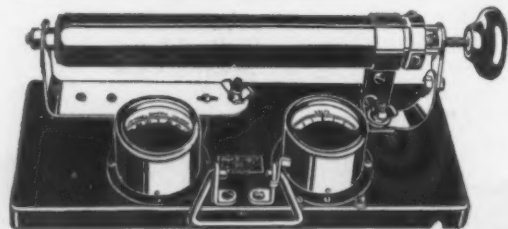
Combination of cords, fabric and elastic material give unusual strength and long wearing qualities. Steam sealed edges make them proof against oil and water. Your jobber can supply you.



Test Outgoing Batteries

without exception, and you will be surprised at the great improvement in your repair work. It will be impossible to send out a repair job with defective or missing separators, defective posts, or other imperfections.

The Allen-Bradley test set will pay for itself in one job if it saves you one customer. One bad job kills the good work of ten others. Don't take such a chance.



And here is the Allen-Bradley high-rate test set which is the best watch dog you can put in your repair department. Get one, today.

Allen-Bradley Co.

Electric Controlling Apparatus

281 Greenfield Ave., Milwaukee, Wis.

Sold by automotive jobbers, everywhere

Allen-Bradley Co.,

281 Greenfield Ave., Milwaukee, Wis.

Please send me your illustrated bulletin on battery testing.



Increased Profits and Satisfied Customers

Ordinary brittle cast iron fly-wheels range in cost from \$10 to \$70. Huetter Steel Fly-Wheel Starter Gear Bands, flawless, quiet and positive, range from \$6 to \$12. That is the story of the low cost of Huetter gear bands reduced to simple facts.

The repairman profits in the lower cost of installation and quicker service to customers. Huetter Gear Bands are carefully welded from high carbon steel according to specifications. The teeth are beveled or pointed on both sides, to mesh with the pinion entering from either side. The dealer may therefore carry a smaller complete line, saving stock room space.

He has only to machine his fly-wheel down to the dimensions given on the gear band and shrink the gear on the wheel. Thus he makes more profit per dollar invested, turns out the work more quickly and gives his customer a better job, at lower cost.

Let us send you our catalogue on

Huetter's

Fly-Wheel Gear Bands

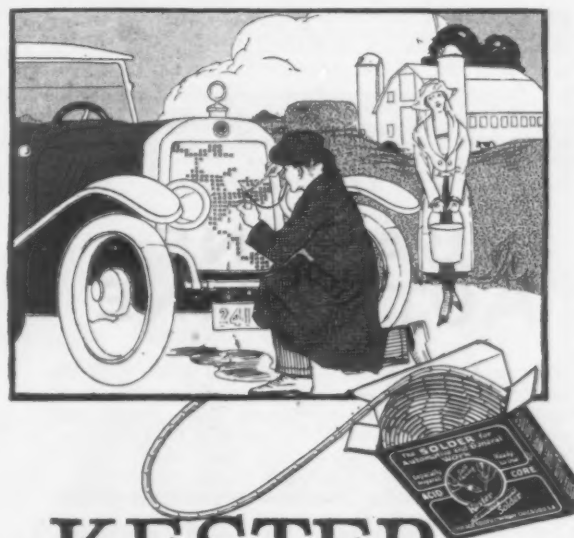
Huetter Machine & Tool Co.

545 Kentucky Ave. Div. A8 Indianapolis, Ind.

Miles From a Repair Shop With a Leaking Radiator—

But the modern motorist is undaunted by such a "fix." With Kester Acid Core Wire Solder and heat the leak is fixed in a jiffy—*permanently* if it's minor—and if the damage is serious, any novice at soldering can patch it securely enough to reach the nearest garage, where a mechanic with the proper tools—and *Kester Solder*—can easily make a permanent mend.

For the motorist and occasional user, Kester comes coiled in one-pound cartons or on one-pound spools, while the garage owner and mechanic find it more economical to buy on five- and ten-pound spools.



KESTER

Acid Core WIRE SOLDER

REQUIRES ONLY HEAT



CHICAGO SOLDER COMPANY
715 Wrightwood Ave., Chicago, Ill.

M. A. 7-27-22

Please send me a sample of Kester Acid Core Solder, no charges, postage prepaid.

Name.....

Address.....

Supply House.....



Insurance Against Delays

Any motor may stall—any car get stuck in mud—any one of a dozen minor accidents halt you on the road—perhaps miles from the nearest garage. But no matter when or where you're stranded, any autoist is sportsman enough to give you a pull, if you've along a

BASLINE AUTOWLINE

You can depend on the "Little Steel Rope with the Big Pull" to haul you out of trouble every time. Made of famous Yellow Strand Wire Rope, with patented Snaffle Hooks that attach instantly and securely. It's the *original* wire rope towline. Fits under seat cushion. With it you can pull out of a ditch or mudhole on your own power. At dealers, \$4.95 east of Rockies.

POWERSTEEL AUTOWLOCK, also made of Yellow Strand Wire Rope, is a safeguard against stealing of car or spare tire. Has sturdy spring lock that can't be picked. At dealers, \$2.50 east of Rockies.

POWERSTEEL TRUCKLINE, "big brother" to Autowline, is for extra-heavy towing. Retails, east of Rockies, at \$8.65 with plain hooks; \$10.10 with Snaffle Hooks.

TO THE TRADE:

Like all widely-advertised products, Baseline Autowline, Powersteel Autowlock and Powersteel Truckline are widely imitated. But there's a good axiom that can be applied to all substitutes: If the original article were not better, it would not be imitated. Push the 3 B & B products—they're the *real thing*! There is money in them for you. Write today for our attractive proposition.

BRODERICK & BASCOM ROPE CO.

ST. LOUIS—NEW YORK

Manufacturers of Celebrated Yellow Strand Wire Rope



\$100

Reward

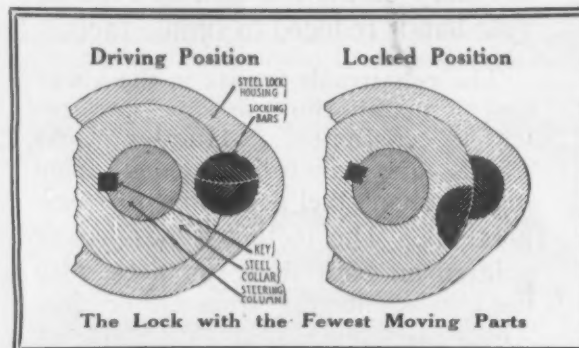
To any one driving a car by friction when properly equipped with a LOWERY FREE WHEEL LOCK.



**Protection
That Does
Protect!**



**The
LOWERY FREE-WHEEL**
"The Steel Enclosed Lock"



FEATURES

Fewest moving parts of any lock made.

Every part made of case-hardened steel.

Gear housing enclosed in case-hardened shield.

No springs to slip, weaken or get out of order.

Locks with a special Yale locking cylinder.

**SIMPLEST
To Install**

Has the approval of the Underwriters' Laboratories

Retail
Price
\$16⁵⁰

A lock that a dealer
can sell to his friends.

Retail
Price
\$16⁵⁰

**IMPOSSIBLE
To Remove**

Correspondence with
FORD and CHEVROLET DEALERS
invited.

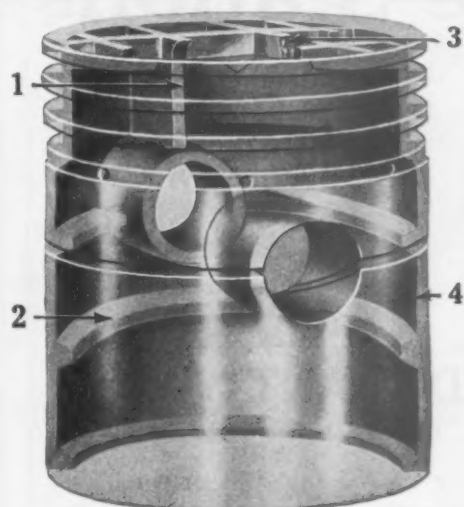
LOWERY & BLAKEMAN

Incorporated

Manufacturers of Automotive Devices

ATLANTA

GEORGIA



- 1 Brace rib, transmitting power impulse from piston head direct to wrist pin. Distributes stress all over bosses.
- 2 Circular stiffening rib holds skirt true, preventing "cocked" piston, uneven wear, and "slap."
- 3 Cross-ribs on head radiate heat faster, and permit thinner, lighter "ceiling" without loss of strength.
- 4 Walls uniformly thick result in uniform expansion all over side walls. Pearlite pistons cannot distort for this reason.

ELMCo Pearlite Lightweight Pistons

Pearlite metal is a gray iron of extreme density. It is mixed in strict accordance with our scientific formula, and every heat is carefully analyzed by experienced chemists.

Pearlite pistons hold their shape in all temperatures. The location of the bracing ribs, and the uniform thickness of wall obviate distortion.

They are machined .075 oversize, allowing sufficient metal for regrinding to an individual fit. Oil drainage is provided below the ring grooves to prevent carbonization. Oil supply is provided by an oil groove round the skirt, which connects with a spiral groove that permits reaming pinholes without chipping and chattering.

There is a good profit to be made on every Pearlite installation. The price is well within your customer's reach. The service he gets from Pearlites brings him back for other work. Ask the name of our nearest distributor.

The Electric Machine Corporation

Pratt & Meridian Sts.

Indianapolis, Ind.



BETTER THAN SHELLAC

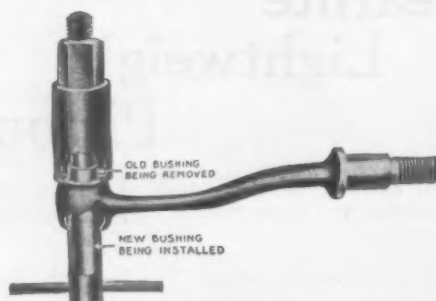
Gasko-Cement

always elastic ~ never brittle

GASKO HAS BEEN ON THE MARKET OVER TWO YEARS and has proven itself. New Sales and re-orders are increasing daily. Wouldn't it be a good idea for YOU to get acquainted with the merits and advantages of GASKO? If it wasn't a better product, we couldn't sell so much of it. A good sized TRIAL TUBE will cost you only 25c—ORDER TODAY! USE IT WHEREVER GASKETS ARE USED.

VAN SICKLE MFG. CO. LINCOLN, NEB

Repairmen—Service Stations



"RED GI-CO"

Spindle Arm Bushing Remover and Replacer

Very simple in construction, easy to operate. Only requires a good wrench and from five to ten minutes to remove and install a set of spindle arm bushings as against one to two hours in the old way. You can save the price of this tool on two jobs. Does not deface the bushing or spindle arm in any way. Guaranteed to give satisfaction.

Retails at \$3.00



"RED GIANT"

Rim Tool

Will contract or expand any split rim in less than five minutes. Does not bend or spring the rim out of shape. This tool is known and used in every State in the Union and Canada.

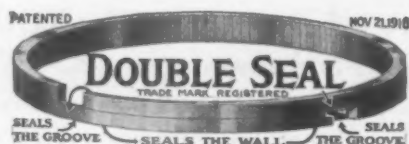
Retails at \$5.00

Write for Jobbers' Prices and Full Illustrated Literature.

Red Giant Tool Corporation
Lynchburg, Virginia

How to Stop "Oil Trouble"

DO IT WITH Double Seal Piston Rings



Branches In All Large
Cities

What is commonly known as "oil trouble" is caused by the kerosene or heavy ends of the fuel getting down past the piston rings into the crankcase and being pumped back into the combustion chamber on the suction stroke of the engine. Thus, the average motor, when throttled down gets more fuel from the crankcase than it does through the carburetor which makes a very rich mixture, causing the spark plugs to foul and carbon to form on the pistons and in the combustion chamber. Poor leaky piston rings are directly responsible for this condition.

In order to overcome this "oil trouble" it is necessary to install piston rings that will hold compression and keep the fuel from getting into the crankcase and keep the oil from getting into the combustion chamber on the suction stroke. DOUBLE SEAL PISTON RINGS successfully do these things. They are good compression rings—good suction rings—good oil rings. Try them and see how they make lasting friends and satisfied customers for you.

DOUBLE SEAL RING COMPANY
General Sales Offices, 2335 Michigan Ave.,
Chicago, Ill.

\$65.00

f. o. b.
Cincinnati1/2-in.
capacity

CINCINNATI Portable Electric "Garage Special" DRILL

Light weight Universal motor for A. C. or D. C. Aluminum motor frame Jacobs Chuck. Ball Bearing

The best buy in portable electric drills ever offered.

Backed by an organization with 20 years experience in making high-grade electric drills and grinders.

For the two **\$89.00** f. o. b. Cincinnati

The Cincinnati Electrical Tool Co.

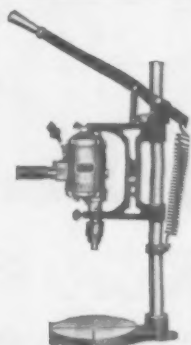
Makers of a complete line of electric drills and grinders

1515 Freeman Ave., Cincinnati, O.

New York 50 Church St.	Philadelphia 1220 Real Estate Trust Bldg.	Detroit Murphy Bldg.
Los Angeles 510 Equitable Bldg.	San Francisco 918 Hearst Bldg.	Chicago 518 Peoples Gas Bldg.

CINCINNATI

PORTABLE
ELECTRIC
TOOLS



CINCINNATI Bench Drilling Stand for "Garage Special" Drill

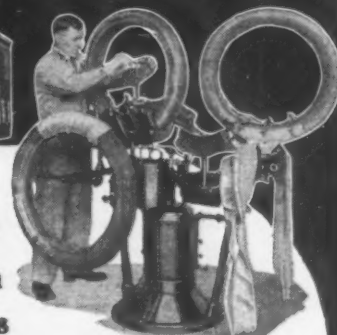
\$24.00

F. O. B. Cincinnati

In a Junk Pile of Tires Evans Found His FORTUNE



Earned
\$5200.00 in
Twelve Months



SO CAN YOU Evans is past middle age. Lives in a small town. Was good carpenter. Irregularity of work and pay made it hard to keep up with rising living costs. Had to do something. Began to look about for good proposition. Had to have something that would bring big earnings quickly. Couldn't afford to lose much time in learning new profession. Wasn't financially able to invest much money. TIRE SURGERY—the new and better tire repair method—was the very chance he wanted. He wrote me. Got all facts quickly. Learned I could teach him in two weeks. Accepted my splendid proposition. Bought one of my new "one-man" machines. Started up in business right in his own town. And in 1920 he cleared over \$5,200.00!

HAYWOOD'S TIRE SURGERY

Gives New Life to Old Worn Tires
You Can Make \$3000 to \$6000 per Year

Opportunities for success—quick success—were never better than now. Seven million car owners in country. Most of them MUST economize. Can't buy new tires. Must make old tires do. They can tinker with their auto, but can't mend tires. This work will swamp present TIRE SURGERY stations. Many more needed in every section of the United States.

Hundreds of Good Locations
Open Right Now!

No experience needed. I'll teach you.

It's a proposition YOU can handle. Cash in on this great ECONOMIC WAVE that is sweeping old tires into repair shops instead of junk piles. Blair of Ohio does more than \$100 daily with small TIRE SURGERY shop. Oldham of Illinois reports recent earnings of \$2,200 in four months. And so on. These men had no experience. Possessed very little capital. Enjoyed no advantages you haven't got, yet they ACTED—got STARTED—now they are making money—lots of it!

Put Name and Address on Coupon

Free Book Gives All Facts. Mail Coupon.

I have ready to mail you the day I receive your request a fascinating FREE book which tells all about tires. How to repair them by the Haywood TIRE SURGERY method. How to start in business. How to build up trade. What to charge. You needn't write a letter. Just tear out coupon. Fill it in and mail. Within 48 to 72 hours you can have the whole proposition before you. It's a case of walking right into \$3,000 to \$6,000 a year. Use the coupon. Address

M. Haywood
Founder of
Haywood
System of
Tire Surgery

M. HAYWOOD, Pres.

Haywood Tire &
Equipment Co.

1174 Capitol Ave., Indianapolis, Ind.

TIRE SURGERY



BUILT THIS BUSINESS

Twelve years ago I started with \$1,000. Today own \$400,000 business. Tire surgery made me rich. Will do the same for you. Let me tell you how.
M. HAYWOOD

Clip and Mail TODAY

Haywood Tire & Equipment Co.,
1174 Capitol Ave., Indianapolis, Ind.

Dear Sir—Please send me by return mail your free book on the new TIRE SURGERY tire repair method.

Name _____

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HARRIS OILS AND GREASES

They Come Back for More!

Motorists who use Harris Oils use them year after year. Because they find that no other oil will give quite the same results. Sell your customers Harris Oils and they'll come back for more. It's the steady customer that's the profitable one! Harris Oils have been on the market over 38 years. Made from straight-run Pennsylvania Crudes.



"America's Leading
Lubricants."

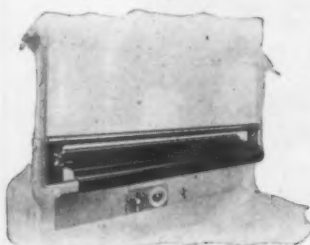
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A. W. Harris Oil Co.

Providence, R. I. Chicago, Ill.

Dealers—Write for sales plan

Real Live Dealers Will Immediately Grasp This Opportunity of Increasing Their Profits



The Phillips "Keep Kool" is THE ventilator for Ford cars.

Reduces the discomforts of hot weather driving; keeps the driver cool from head to foot—without lowering top of windshield.

6 Important Advantages:

1. Gives more ventilation than a tilted windshield or any other ventilator on the market.
2. Directs cool air on the feet of the driver.
3. Absolutely rain tight when closed—protects the coil box.
4. Made to fit standard Ford windshield frame.
5. Adjusted in an instant—no screws to make tight or loose.
6. Can be locked in any position and does not rattle.

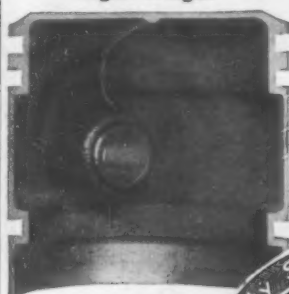


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Oil Eliminating



Profit
Paying
Pistons



For
All
Fords

Good Money for Regrinders

These pistons are ground .070 oversize, and left semi-finished with a center boss on the head and the skirt counter-bored. Finish-grinding them to an individual fit for the customer's engine takes little time, so makes the customer happy, and brings you a quicker return. Our oil-eliminating piston has an oil-groove at the level of the pin-hole, and another just below the second ring-groove, pierced with ten oil holes. These collect surplus oil, draining it into crankcase. Ask for illustrated folders that tell all details, and include liberally discounted prices.

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Marshalltown, Iowa



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"Grip Like a Grizzly"

—because they have reserve strength ALL OVER! Renewable tool steel jaws, a steel "backbone" in the slide, a solid underportion, and a swivel that grips like the jaws! *Uniform sturdiness*—which has kept "Parkers" in the great shops of the U. S. and Canada for 80 years—is also rapidly placing them in our best service stations. Send for Feature Folder No. 9.

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Master Vise Makers, MERIDEN, CONN., U. S. A.

Meeting Every Logical Design Demand



Twin-groove



Quic-fit



D.W. Plain

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We carry complete stocks of the three ring types illustrated above and described below. Functions, quality and prices considered, they will hold a strong appeal to the trade. This ring assortment gives you or your customer a wide option on selection. The range of prices is equally wide. All service requirements may be met with one stock from one old and reliable manufacturer. Orders may be made up as desired from this group of high quality piston rings. "The Right Ring for Every Groove."

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Channels collect oil and drain surplus. Distribution is perfect. Compression positively sealed. No oil can reach lap joint. "The Right Ring for the Lower Groove."

List prices—	
2 3/8 to 4"	\$.50
4 1/16 to 4 1/2"	.60
4 9/16 to 5"	.70

QUIC-FIT

A permanent, self-acting compensating device. Even expansion on walls regardless of cylinder wear. Note grooves. They guarantee this reaction. "Quick seating. The Right Ring for the Top Groove."

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D. W.

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Known and used for 12 years in repair and regrinding fields. A plain ring made from same quality material used in Twin Groove and Quic-Fit. Serviceable. Profitable.

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Eliminates the tedious, old-fashioned method of soldering on terminals for wiring jobs, and losing ten minutes' time with each operation. It is simply a case of removing the insulation from the wire ends, splitting the cable, twisting the wire around brasslet—and operating punch.

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1000 Brasslets and 1-inch Nickel-plated Punch, \$1.80



No. 45

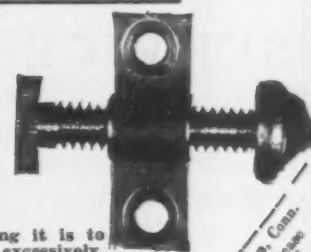
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Every motorist knows how annoying it is to have the windows of his car rattle excessively. This continuous vibration weakens the window holding, so that damage may result. Elm City Anti-Rattlers prevent this nuisance. Strong, well-made and will withstand any strain or vibration.

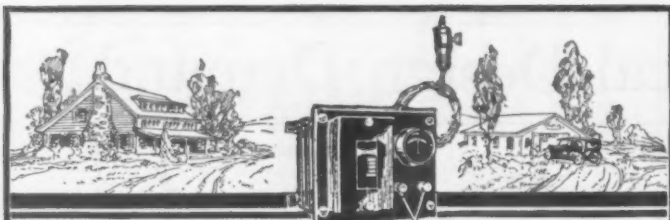
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If you are not already handling Elm City Auto Accessories, fill in and mail the coupon.

The C. S. Mersick & Co.
274 State St. New Haven, Conn.



Send coupon and name of dealer to whom please send Elm City Terminal Outfit and Elm City Anti-Rattlers.
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A. 45



The life of a Battery is doubled
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A Homcharged battery lasts longer, never freezes, gives brighter lights and starts your car instantly even in the coldest weather.

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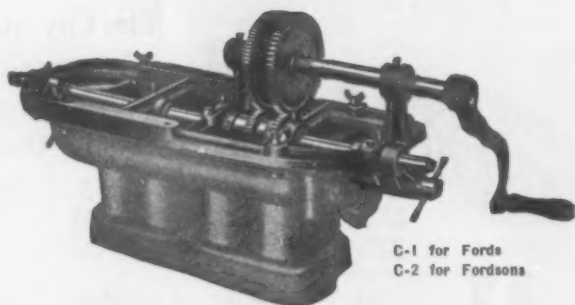
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There is a nice big profit in this new, easy-selling accessory. Dealers all over the country are selling thousands of these money-makers. Don't Delay—Order Today. Most jobbers can supply you. If not, write direct for a half-dozen or so.

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For Paper Gaskets in Automotive Work



Save Without Skimping

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"775" insulator is especially made to resist heat and to live long. That's the reason most good spark plug manufacturers use it. It identifies their spark plugs as the best on the market.

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Busy Ever Since"

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For replacement work after a rebore or re-grind job insures your customer as good if not a better job than the original assembly.

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Insure Your Business Success

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SPIRAL CUT

The premier piston ring of America. Patented spiral cut makes it uncoil like a spring with correct tension against every point of the cylinder wall. Equal width and thickness all around—no gap—no weak places.



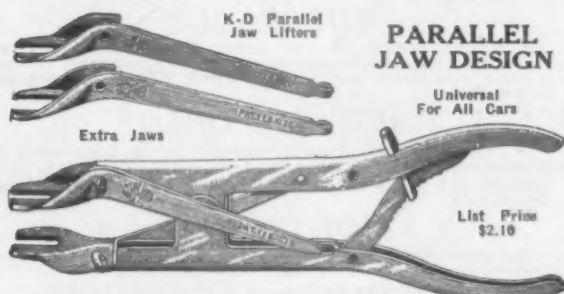
Stops oil pumping. Bottom oil groove "wipes" excess oil from cylinder wall on each down stroke of the piston; top groove acts as a lubrication pocket. Quick seating insured by "velvet" finish.

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Here we present three exclusive features—Perfect Parallel Lift—Interchangeable Jaws—Self Contained Quick Acting Locking Device.

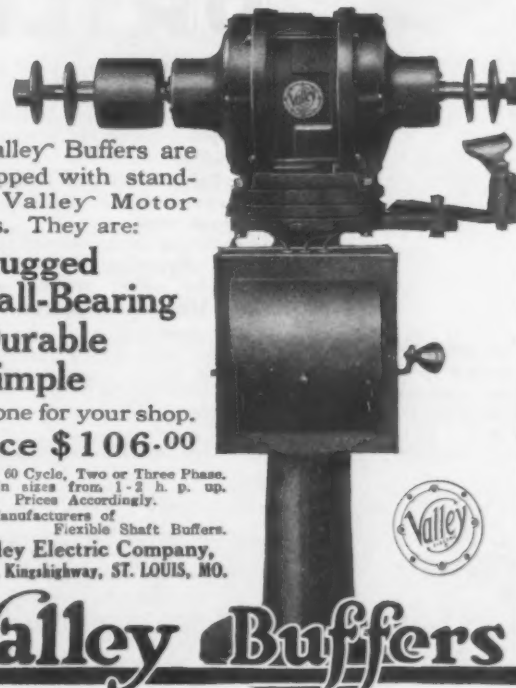
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Most radiators brought in for repairs are not worth repairing, but the car, truck or tractor owner, in trying to reduce expense, often insists on repairs in spite of advice to the contrary. This means a good sized bill for labor, with results that often do not permit full cooling efficiency—and soon a new radiator is necessary.

The proper thing to do is to recore instead of repair

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Radiator Cores

for Motor Cars, Trucks, and Tractors

85% pure Lake Copper, which is elastic and burst proof, and which absorbs vibration, is the material of which All-Wright cores are made. You can furnish your customer with an All-Wright core, install it and guarantee him 100 per cent service from it, at a price that is only a little over the cost of one or two repair bills, and make a good profit for yourself.

At a very small investment you can add a radiator department to your shop, do the work RIGHT and realize good returns from your money.

Write and ask us for prices and information.

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RADIATOR CORE & EQUIPMENT MFG. CO.

MANUFACTURERS OF RADIATOR CORES FOR
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In production or repair work—wherever high speed bits are used—CLARK AUTOMATIC DRILL will do the job efficiently, economically and rapidly.

It is light in weight—evenly balanced—yet built to withstand hard continuous service.

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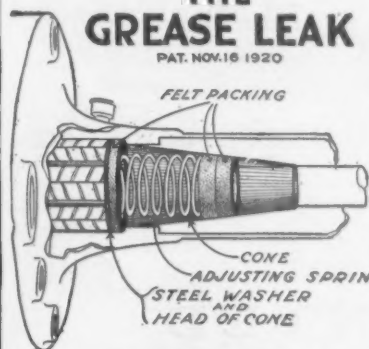
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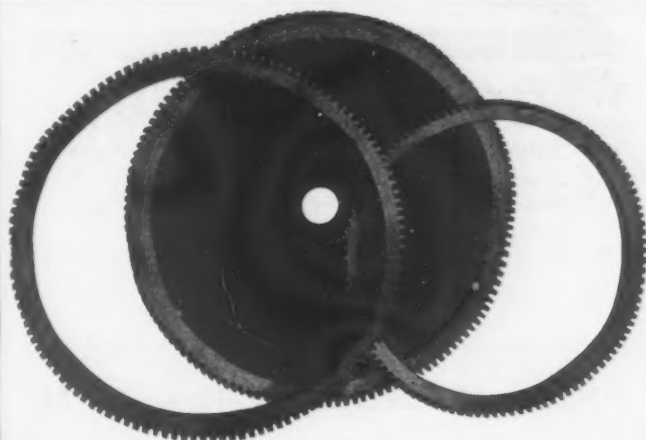
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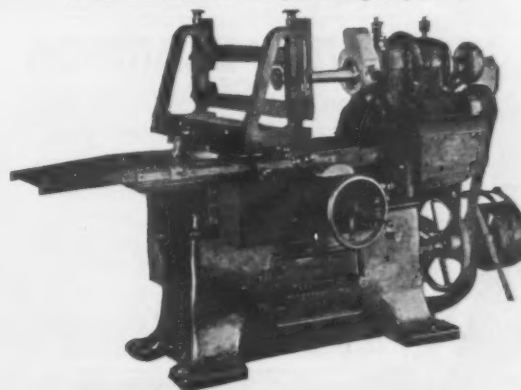
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Factory representatives. High grade, experienced automobile men, able to get best grade of dealers for fast selling popular line of passenger and commercial cars. Permanent, growing opportunity. State experiences, age, references as to ability and character, previous earnings and territorial preferences, if any, with reasons for preference, and when you will be available. Address Box E-5098, Care Motor Age, 5 So. Wabash Ave., Chicago, Ill.

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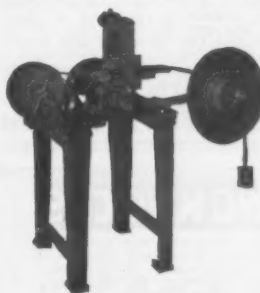
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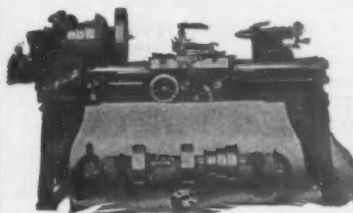
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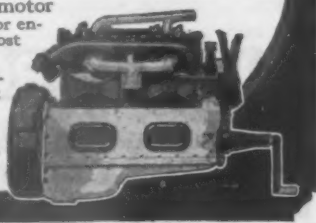
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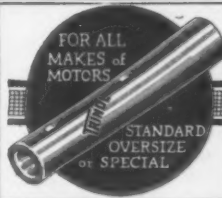
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Repair and service men, when they need piston pins—and want the best, delivered quick—automatically think of Trindl. For quality pins, in standard, oversize and special sizes, neither quality nor service can come up to the Trindl Service. Try it.

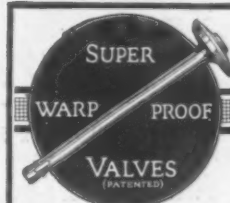
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Send For The Super Warp Proof Valves

Special alloy steel valves, with large underheads for rapid inlet of gas and outlet of dead gas. Manufactured by a special patented process which insures long life under most severe conditions—and they are doing it every day. Standard oversize and specials in quick time.

The Trindl Co. 2917 Wabash Ave., Chicago, Ill.



25¢

For Ford Cars

HORSE SHOE SPARK PLUGS

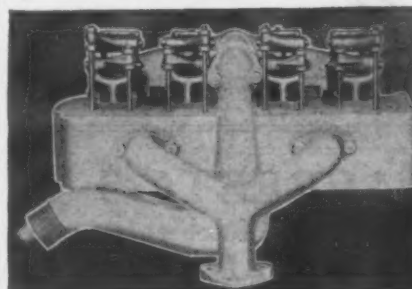
As good a Spark Plug as can be made—yet retails for 25¢, 20% discount to dealers. Order 100 today—try this as a leader.

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ROOF 16 OVERHEAD VALVE EQUIPMENT For Ford and Dodge Motors

ROOF 8 VALVE HEAD FOR FORD MOTOR

Stupendous Power—Lightning Speed



Ford racing cars with Roof Equipment are rivals on mile and one half mile tracks of the highest priced racing cars. Doubles the pulling power of the Ford or Dodge pleasure car or truck. Hill climbing and general road work beyond wildest dreams of the owner. Complete — ready for installation — no machine work necessary. We are headquarters for all speed equipment. No matter what you want, write us. Racing quality — lowest prices. A postal card brings you complete list of our specialties.

Jobbers—Dealers—Consumers—Write Us
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Badger Spring Bar Bumpers

A complete line of spring bar bumpers in single and double span types

Fit front and rear of all cars.

BADGER MANUFACTURING CORP.
MILWAUKEE WISCONSIN



Swartz Pistons are cast in our own foundries and machined in keeping with most advanced practices. The precision, materials and skill maintained in their manufacture are your guarantee of entire piston satisfaction.

We have a piston for most every make of passenger car, truck and tractor.

Carried by all leading jobbers; if yours doesn't handle them, send for our Piston Directory today.

THE SWARTZ MFG. COMPANY, Freeport, Ill., U. S. A.

District Selling Agents WANTED for Motor Car Accessories

If you have selling connections with automotive jobbers and dealers and wish to take on a motor accessory with unlimited selling possibilities let us know what territory you cover, how many salesmen you travel, if any, and how many lines you now carry. Liberal commissions allowed. Local agents also wanted. Address Box E-6001 Motor Age, Mallers Building, 5 So. Wabash Ave., Chicago, Ill.

SHAFFER Self-Aligning ROLLER BEARING

Justifies its growing popularity by real service
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U. S. ASBESTOS Also Durabestos & Motobestos BRAKE LINING

Unequalled in its Performance

United States Asbestos Co.

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The Custom Built Car



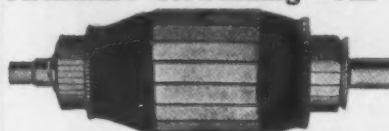
The Aristocrats of Motordom

7 Models-Open and Closed

Distributors in principal cities
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Kissel Motor Car Co.
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Armature Rewinding—All Work Guaranteed



Special prices in quantities. Write for price list giving all types. (The head of our armature department was formerly associated as an Electrical engineer with the Auto-Lite and Berling Magneto Companies.)

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Won't Leak Because They're Sealed With Oil



No-Leak-O Piston Rings are making money for dealers everywhere. Their "oilSEALING" groove—found only in No-Leak-O—packs an oil film in between piston and cylinder walls like "packing" in a pump. Oil and gas stay where they belong. National advertising is helping the dealer sell No-Leak-O by teaching the motorist the lesson of more mileage on less oil and gas.

It will pay you to stock No-Leak-O at once.

Price 50c and up.

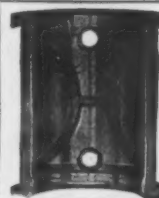
NO-LEAK-O PISTON RING CO., Dept. T-57, Baltimore, Md.

STOP BEARING KNOCKS



Install Kil-Nock Automatic Bearing Bolts and forget having to "take-up" bearings. They build trade, and make good profits. If jobber can't supply, order direct. Set of 8 for Ford, Chevrolet, Overland, etc., \$5. Set of 8 for Fordson, Dodge, etc., \$3. Address Ramsey Accessories Mfg. Co., Sole U. S. Distributors, 1509 N. Broadway, St. Louis

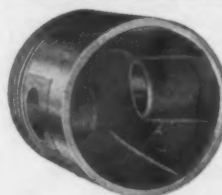
Manufactured by Kil-Nock Co., Inc., Davenport, Iowa



"MILWAUKEE" BEARINGS

For all cars and trucks, most tractors and many stationary engines. Bronze backed babbit lined and solid babbit die cast. Porosity eliminated by special process. Send for name of distributor nearest you. Distributors learn of our proposition.

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297 Fourth Street Milwaukee, Wisconsin



FOSTER PISTONS

Durability and reliability is built into this new type of ribbed piston. They build these same qualities into the reputation of every service station using them.

Get our large catalogue at once. It tells all.

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a profit
earner
for YOU

Beacon Visible Gasoline System

Double check. Pay only for the gas you get. Makes satisfied customers. Write for catalogue.

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Incorporated

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Sales
Dept.
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Hoyt
ELECTRICAL
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“AUTEX”

EXTENSION REEL

For Electric Lights.

Fully approved by the National Board of Underwriters.

Patented: Oct. 1915, Jan. 1917 and Dec. 1920.

The “AUTEX” is also being extensively used by many of our largest industrial plants for portable drill and other electrical unit extensions.

Made in two sizes—for 25 ft. and 50 ft. reinforced cord. Automatically winds and locks at any desired point. Its swivel-joint feature enables the light to be taken in any direction from the reel. Write for particulars.

The Cincinnati Specialty Mfg. Co., Inc.
Powers St. Cincinnati, Ohio



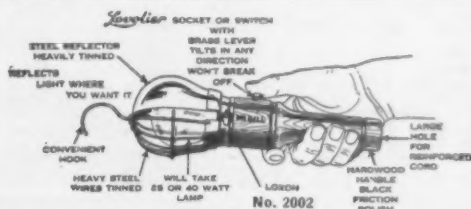
SELL OIL FROM THE CURB

The Correct Measure Motor Oil Display Pump will increase your oil business. Handsome. Compels attention. Delivers $\frac{1}{2}$ gallon in 12 seconds. Can be put on curb in morning—and back indoors at night. \$45 PER UNIT. Write for details concerning this money maker.

Correct Measure Co., Inc.,
Rochester, Pa.

\$45
Per
Unit

CORRECT MEASURE
MOTOR OIL DISPLAY PUMP



Safe Light Where & When Wanted

Operated by a thumb switch on the handle, this thumb-switch lamp guard for 25 and 50-watt mill type lamps is always turned off when unused. No reaching for the switch—consequently no “forgetting” and big light bills. The heavily tinned steel reflector and guard are fastened by Loxon clamp to polished wood handle. Lamp cannot rest on inflammable material and start fires. Unusually strong, and very compact. Will enter places where ordinary guards won't go. Ample air space between reflector and lamp prevents burnt hands. Your jobber can fill your order for a half-dozen. Send it to him now.

McGILL MANUFACTURING CO., Valparaiso, Ind.

New Departure Ball Bearings

COMPLETE INFORMATION

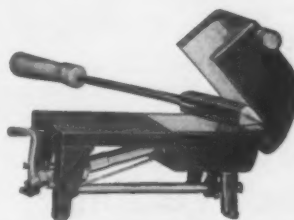
On Automotive Cables, Description—
Sizes—Diameters, Classified as to Service—Fully Illustrated Will Be Found in the Current Issue of

Automotive Equipment Association Catalogue.
The Automobile Trade Directory.
Chilton Automobile Directory.

The Packard
Electric Company

WARREN,
OHIO

Johnson Direct-Jet Soldering Iron Furnaces

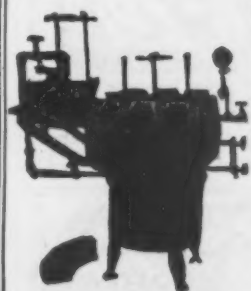


Built in sizes and styles to meet all conditions of work and sizes of coppers.

Require no forced draft; are extremely economical of gas.

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The Standard Vulcanizer Equipment for Repair Shop Use

A complete line, covering every requirement of the trade.
—Vulcanizers, Retreaders, Tube Plates, Steam Boilers, Tools, etc.
Write today for descriptive literature.

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AKRON-RUBBERMOLD
TIRE REPAIR EQUIPMENT

E-C-L Pistons

ALUMINUM ALLOY NON EXPANDING



How to Eliminate Piston Slap

Piston Slap is a common and vexatious cause of engine trouble which in the past has bothered most car owners.

But it can now be eliminated. With the E. C. L. Aluminum Alloy Non-Expanding Piston. E. C. L. Pistons may be fitted with a closer degree of clearance than cast iron pistons. They reduce the consumption of gas and oil—Increase power and speed and eliminate spark knocks.

Let us tell you more about this remarkable piston. Write for the details today.

E. C. LONG

Main Office and Factory

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VACUUM DRIVEN TIRE PUMP

VACUUM PRESSURE PRODUCTS CO., Inc.
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A better, quicker, engine-operated tire pump—that sells for less. A great dealer opportunity. Write for details today.

BURD Piston Rings

EXCEL IN SERVICE AND EFFICIENCY

Sold by All Jobbers
BURD HIGH COMPRESSION RING CO., ROCKFORD, ILL.

The Combination
Mirror and Park-
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CLOX- LITE

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Clox-Lite Products Corp., 271 Central Ave., Newark, N. J.
Factory: Perkasi, Penn.

The Halt Signal
— which can
also serve as a
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THE HYDRAULIC CONTROL
More than a Shock Absorber because it fluid-cushions all movements between the body and the chassis—gives a new experience in riding comfort.

Good distribution territory is still to be allotted. For information write to

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WEIGH LIGHTEST · FIT TIGHTEST

Regrinders, Repair Men, Dealers
Write for literature, price list and liberal proposition. Prompt service and delivery on all standard and special oversizes up to .065. Over 600 models.

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Oxy-Acetylene Welding

Your Hardest Jobs Solicited on Aluminum Crank Cases, Cylinder Block Case Units and Tractor Parts. We Do Welding for Other Shops—Let Us Help You.

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50% off on Replacement Parts
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We carry in stock ready for shipment over 400 parts.
Write or wire your order and cash in on this big additional profit. All parts positively guaranteed. Ask for catalogue.
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OVER 50 WONDERFUL SHORT CUTS
IN NEW CATALOG T-105
ASK FOR IT
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FAUROT—SCOPE

AN ANTI-THEFT DEVICE FOR MOTOR CARS

The Faurot-Scope reduces the cost of automobile theft insurance 15%. Automobiles equipped with the Faurot-Scope are immune to the \$35 penalty in force in some localities.

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The complete timer that frequently outlasts four ordinary roller contact timers. Write EAGLE TIMER Co., Ridgely, Md.

EAGLE

TIMER FOR FORDS



no glare

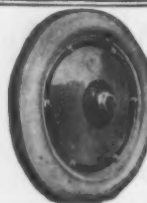
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A curtain that fits on the windshield of every make of car and keeps dazzling lights out of the driver's eyes. Can be lowered or raised at will. Retail for \$2.50.

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There is a Harvey Steel Disc Wheel in the various styles which we make for each size of car at interesting prices.



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You can reduce them 15% if your car carries a **POMEROY PATENTED ELECTRIC GASAFIER**

Start immediately in any weather and save your battery. \$5 buys one. Now entering fourth season.

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Motor is the

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"PILOT" STEERING GEAR

A new standard of steering gear value now offered to the makers of America's fine cars. Combines durability, simplicity, smoothness of action, freedom from rattling. Made in the finest steering gear plant in America.
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Manufacturers, exchange specifications with us. Let us quote on your requirements.

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NEW YORK OFFICE:
51 Chambers St.**200,000 IN STOCK***The Complete Line
Immediate Service*

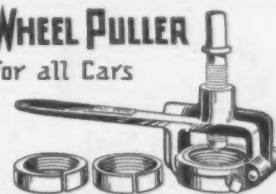
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CLEAN-QUICK-POSITIVE
THE LARKIN AUTOMOTIVE PARTS CO. DAYTON OHIOHave you read about the Toquet Oiling System for
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Big Profits Charging BatteriesBalance on long easy terms, more than paid for by
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PISTON RINGS**Less Oil and Gas—from
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ELECTRICAL TESTING EQUIPMENTEVERYTHING FROM A TEST PROD
TO A UNIVERSAL TEST BENCH*Write Today for Bulletin M18***JOSEPH WEIDENHOFF**

4358 W. ROOSEVELT ROAD

CHICAGO, ILL., U. S. A.

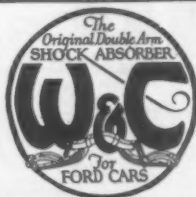
The Well Equipped Shop Gets the Business**TRAINOR
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**For All Cars and
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COMPLETE SIGNAL SYSTEM
1,000,000 Tests
Without a Miss*Some Record!***AKRON SIGNAL CO., AKRON, O.****WILLIAMS ACCELERATOR**
FOR FORD CARSMANUFACTURED BY
WILLIAMS BROS.
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FOR SALE AT ALL DEALERS

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AND WORTH IF**\$2.50 WEBSTER
MAGNET LIGHT**
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RACINE, WISCONSIN, U. S. A.**STORM**
MOTOR REPAIR EQUIPMENTEquip your garage for the most
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and Your Jobber Will Give You the
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W. & C. Shock Absorbers Sell
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FOR
**ELECTRICAL
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**Perfect Seal
Piston Rings**

Distributors—Good Money

can be made in the new territories now
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—the piston ring with the position-
retaining shoulder. Write today for our
good proposition.

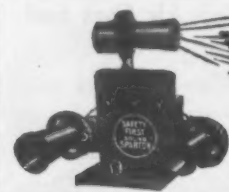
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YAHOOOTA
Let your customers hear the
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Special display board given free with initial
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Stops spilling, and slippery floors. Saves upholstery.
Economizes in grease. Wheels to the job, and sets
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PISTON RING

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Requires no fitting or filing—exerts even wall pressure—has an overlapping seal
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When you find Ames dial gauges in the finest
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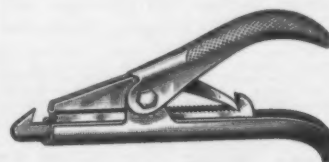


PRESTIGE AND PROFITS accumulate to the dealer
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Its superiority is instantly established. That draws
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IT GETS THE PIN

Reaches into most inaccessible
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Mays Cotter Pin Puller

Saves labor and annoyance of
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\$3.00

Always Accurate—**CARTER OIL GAUGE** for
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or money refunded. Write for prices and liberal
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HOUZE TRANSPARENT GLASS

COLORED
For Auto Floors, Wings, Curtain Lights, etc.

Makes Night Driving Safe
against blinding headlight dazzle and prevents sun
glare when used in your auto visor.
Write for samples of colors.

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Borg & Beck Heat Indicator

A "Theft-Proof" Scientific instrument installed on the instrument board,—
easily read by day or at night. It tells at a glance the True MOTOR Temper-
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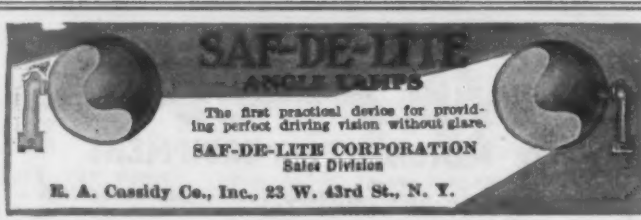
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Air Compressors; Gasoline and Oil Storage Sys-
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WAYNE TANK & PUMP COMPANY.
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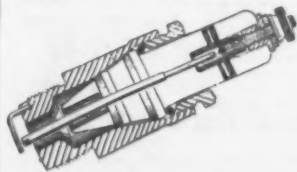
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The first practical device for provid-
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SAF-DE-LITE CORPORATION
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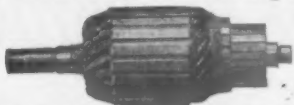
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SPARK PLUG
Easiest to clean
 Write for liberal trade discounts.
DURO COMPANY
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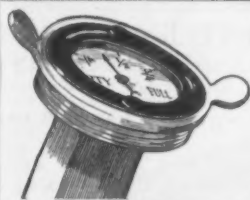
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FORD
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\$2.00



MOST ANY
TWO UNIT
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ALL WORK GUARANTEED—WRITE FOR PRICE LIST
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Tasco Visible Gas Gauge For Fords

Tells instantly supply of gas. Simply insert instead of regular gas cap. Retails for \$1.00. Every Ford owner wants one. Order from jobber or direct.

LIBERAL DISCOUNT

The Akron Sells Co., Akron, Ohio

REPLACEMENT PISTONS

Same weights, metals and machining as original equipment—no features or departures from motor manufacturers' specifications. Eliminate uncertainty by replacing with the same kind of pistons as furnished with the original job.

Jobbers: A most unusual proposition awaits your request for details
 Write today.

OHIO PISTON COMPANY

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ALVORD QUALITY TOOLS



Taps, Dies, Cutters, Drills, Reamers
Send for Catalog
ALVORD REAMER & TOOL COMPANY
Millersburg, Pa.

"The Well-Equipped Shop Gets the Business"

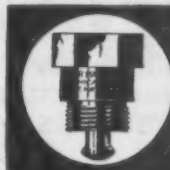


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Kokomo
TIRES AND TUBES

KOKOMO RUBBER CO., Kokomo, Indiana
131 South Main St.

Kokomo Long Life tires and tubes make money for dealers who handle them.

Kokomo Twin-Grip Fabrics
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Keep Spark Plugs Clean. Put "Pep" in the Motor. Increase Gas Mileage. Ideal for Oil Pumping Motors.
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SHOCK ABSORBERS FOR ALL FORDS



Better shock absorbers, not involving changes to spring installation. No top heaviness or side sway. Sell with minimum effort; pay large profits. Details of attractive sales plan on request.
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Pumps are made for trucks and cars. Have Standard S. A. E. mounting. From \$25 to \$75. Compressor made in 1/4, 1/2, 1 h. p., small size \$85.

Spokrer
ELECTRIC DRIVEN COMPRESSOR

Write for details to
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 Sixth Ave. & 13th St., Newark, N. J.

(Sample of deep, drawn work)

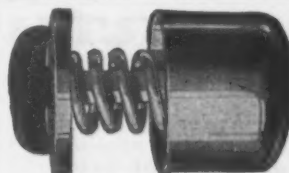


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Complete equipment, an efficient organization, and 40 years' experience enable this company to render prompt service and turn out metal stampings of the highest quality. Both our work and prices will please. Let us figure with you.

Dickey-Grabler Works, Cleveland, O.

Manufacturers of Metal Specialties and Marking Devices



LAMBERT LICENSE PLATE HOLDER

Slip holder through plate, then through bracket, give quarter turn and your plate is on to stay.

No Noise. No Rattle.
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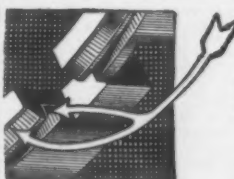
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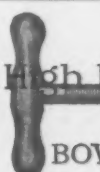
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Kant Score Piston Co., The.....124
Kauffman Metal Prod. Co.....60
Kellogg Mfg. Co.....128
Keystone Reamer & Tool Co.....128
Kil-Noek Co.....122
Kissel Motor Car Co.....122
Kokomo Rubber Co.....127

Lambert Mfg. Co.....127
Landis Tool Co.....125
Larkin Auto Parts Co.....125
Laurel Motors Corp.....121
Lavine Gear Co.....124
Leach Motor Car Co.....126
Lexington Motor Car Co.....3rd Cov.
Long, E. C.....123
Louisville Elec. Mfg. Co.....120
Lowery & Blakeman.....110
Lycoming Motors Corp.....93

McGill Mfg. Co.....123
Macorvey Co.....119
Manley Mfg. Co.....69
Master-Cord Belt Co.....108
Meachem Gear Corp.....119
Mersick, C. S., & Co., The.....115
Miles Piston Ring Co.....126
Milwaukee Die Casting Co.....122
Monkey Grip Rubber Co.....95
Motor Master Corp.....127
Motor Wheel Corp.....90
Myles Standish Mfg. Co.....121
Murray Rubber Co.....8

Nash Motors Co.....6
National Spring Co.....125
Nauth Elec. Service Co.....122
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Nichoff, Paul G.....128
No Glare Mfg. Co.....124
No-Leak-O Piston Ring Co.....122
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Oesterlein Mach. Co.....85
Ohio Piston Co.....127
Olds Motor Works.....4

Pacific Ball Bearing Co.....121
Packard Elec. Co.....123
Parker, Charles Co.....114
Patriot Mfg. Co.....107
Phillips, F. C.....114
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Radiator Eng. Co.....121
Red Giant Tool Corp.....112

Redin-Ekstrom Co.....126
Reliance Auto Devices, Inc.....125
Rich Steel Products Co.....127
Robertson Bros. Mfg. Co.....107
Rub-Tex Products, Inc.....63
Ruggles Motor Truck Co.....57
Russell Mfg. Co.....80 & 81

Saf-de-Lite Corp.....126
Schmidt, B. L., Co.....119
Schrader's, A., Son, Inc.....70 & 71
Shafer Roller Bearing Co.....122
Shaler, C. A., Co.....120
Shepard-Thomason Co.....125
Snap-On Wrench Co.....127
Sparks-Withington Co.....126
Star Rubber Co.....128
Stevens & Co.....124
Stewart-Warner Speedometer Corp.....77
Storm Mfg. Co.....125
Stromberg Motor Devices Co.....75
Sunderland Mach. & Supply Co.....132
Superior Motor Power Co.....120
Swartz Mfg. Co.....122

Templar Motors Corp.....2
Thermoid Rubber Co.....101 & 102
Thomas, W. H., Mfg. Co.....82
Timken Roller Bearing Co.....61
Trindl Co., The.....121
Turner Mach. & Mfg. Co.....120

U. S. Asbestos Co.....122
U. S. Auto Supply Co.....127
U. S. Products Co.....64
Universal Industrial Corp.....62
Universal Mach. Co.....137

Vacuum Pressure Prod. Co.....124
Valley Electric Co.....117
Van Norman Mach. Tool Co.....125
Van Sickle Mfg. Co.....111
Velle Motors Corp.....84

Warner Gear Co.....124
Watervliet Tool Co.....128
Waukesha Motor Co.....121
Wayne Tank & Pump Co.....126
Weaver Mfg. Co.....78
Webber, P. H., Co.....126
Weber Auto Accessory Co.....127
Webster Electric Co.....125
Weidenhoff, Joseph.....125
Welever Piston Ring Co.....125
White Brass Castings Co.....124
Williams Bros. Aircraft Corp.....125
Williams Soft Pedal Co.....118

Zenith Carburetor Co.....58

Mr. Service Man

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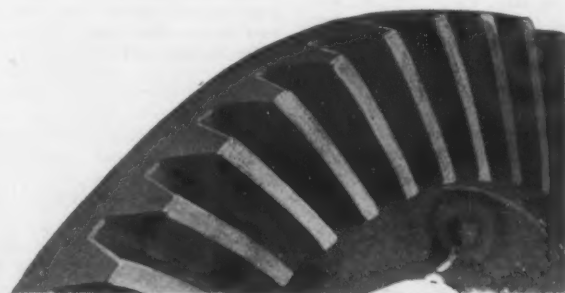
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